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News about

B.F.Goodrich Chemical *raw materials*

FOR RESISTANCE TO HIGH TEMPERATURE SULPHUR-BEARING OILS USE HYCAR 4021

This polyacrylic rubber operates at 350° to 400°F.—higher by 50° to 100° than most other rubbers can withstand. In addition, Hycar 4021 provides unusually high oil resistance, remains soft and flexible even when subjected to sulfur-bearing oils.

Hycar 4021 is widely used in automotive transmission seals. Its excellent high-temperature resistance, high physical properties and good compression set make it the choice for oil hose, automotive gaskets, searchlight gaskets and "O" rings —especially where they are in contact with high-pressure lubricants. Other uses are for belting, tank linings, white or pastel colored goods and cement coatings for cloth.

A new bulletin, HM-3, covering the advantages and compounding of Hycar 4021 has been prepared. For a copy, or for information about any of the many Hycar rubbers and latices, write Dept. CA-5, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Hycar
REG. U.S. PAT. OFF.
Rubber and Latex

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

More SP Rubber from Malaya

Yes, here is something that is going to make life easier for another production team. They have specified SP (Superior Processing) Rubber because they know that for quality extrusions it pays dividends by speeding production and cutting rejects . . . that it helps them make a better product at lower cost . . . that it makes "difficult" specifications practicable. And for calendering, particularly for hand-built goods, its advantages are quite as striking.

Consumption of this new form of natural rubber already exceeds a four-figure annual tonnage and production is being expanded to meet future demand. It is a controlled product made to the specifications of the natural rubber industry's Rubber Research Institute, Malaya, and is available through normal trade channels. If you would like to know more about SP Rubber please write to us.

NATURAL RUBBER

A PRODUCT OF NATURE plus SCIENCE

Natural Rubber Bureau

1631 K Street N.W., Washington 6, D.C.

Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

JUNE, 1959 VOL. 85 NO. 3

Published Monthly by
PALMERTON PUBLISHING CO., INC.
Editorial and Advertising Offices
101 West 31 St., New York 1, N. Y.
Phone: PEnnsylvania 6-6872

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*Appears every other month

Microfilm copies of complete volumes of RUBBER AGE are available from University Microfilms, 313 North First St., Ann Arbor, Mich.
Indexed in Industrial Arts Index and Engineering Index

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RUBBER AGE is published monthly by the Palmerton Publishing Co., Inc. Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 101 West 31st Street, New York 1, N. Y. Entered as second class matter Oct. 30, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $5.00 a year; Canada, $5.50; Foreign, $6.00; June, 1959, Vol. 85, No. 3.

Highlights Sidelights *of the News . . .*

June, 1959

Some 630 members and guests of the Division of Rubber Chemistry, A.C.S., were in attendance at the Spring Meeting of the organization held on May 13 to 15 in Los Angeles, Calif. . . . The three-day meeting featured the presentation of 37 technical papers divided into five sessions . . . It was announced at the meeting that Dr. Fernley H. Banbury had been selected as the Goodyear Medalist for 1959 (page 460).

Seiberling Rubber Co. and the General Tire & Rubber Co. have signed new contracts with the United Rubber Workers similar to that signed previously by Goodyear . . . The main features of the agreements are liberalized pension and insurance programs (page 465).

Flintkote Co. has announced that its subsidiary, the Patent and Licensing Corp., is now prepared to license a new process in which synthetic rubber can be dewatered during manufacture through the use of a special Banbury mixer . . . The new process ,invented by Dr. Paul Dasher, is said to permit the mixing and drying of synthetic rubber in one operation (page 469).

International Latex Co. has begun operations at a newly constructed laboratory for the development of synthetic latices tailored for various industrial applications . . . The new laboratory employs more than 50 researchers organized in groups to approach problems of latex application in carpets, paints, non-woven fabrics, foam rubber, paper, textiles and adhesives (page 466).

A new chlorosulfonated polyethylene polymer, desigated "Hypalon 40", has been announced by DuPont . . . The new rubber is said to offer greatly improved processibility over other Hypalon types and many conventional elastomers (page 467).

The Division of Rubber Chemistry of the Chemical Institute of Canada held its Annual Meeting on May 1 in Niagara Falls, Ont., Canada, with some 185 members and guests in attendance . . . The meeting featured a morning technical session and an afternoon symposium on "Aging ad Weathering of Elastomers" (page 477).

Goodrich has disclosed that within the next two years it will be operating three new tire plants and a special purpose synthetic rubber plant abroad . . . The company will hold a majority stock interest in these facilities . . . One new tire plant is planned for Brazil, another for Australia and a third for Iran . . . The synthetic plant will be located in Holland (page 475).

NEW! HYPALON®

HUBER RUBBER CLAYS ARE UNI FORM SUPREX PARAGON LGB LGP HI-WHITE R

For rubber reinforcing pigments, think of Huber

J. M. HUBER CORPORATION 630 THIRD AVENUE, NEW YORK 17, N.Y. • **Carbon Blacks • Clays • Rubber Chemicals**

Wise owls read Huber Technical Data. Ask to be put on our mailing list.

NEW! HYPALON®

40

- **IMPROVED PROCESSABILITY**
- **IMPROVED PHYSICAL PROPERTIES**

HYPALON 40 synthetic rubber is a new type of chlorosulfonated polyethylene polymer with marked improvement in processing and physical properties.

HYPALON 40 has been thoroughly tested in a number of commercial plants producing wire and cable, hose, coated fabrics, extruded and molded goods and industrial rolls. Processability in these trial runs was excellent.

HYPALON 40 bands quickly on the mill and forms a smooth sheet that holds together and releases easily. It dumps cleanly from Banburys. Banbury dump temperatures may be as low as 180° F. Breakdown or peptizers are not needed.

On factory calenders unsupported films as thin as 2 mils were produced. Extrusions, even of lightly loaded stocks, have low die swell, sharply defined profiles, excellent smoothness and gloss.

HYPALON 40 will not support combustion and has neoprene's resistance to oil and solvents. It retains all of HYPALON 20's resistance to ozone, heat aging and oxidizing chemicals. In addition, it has excellent compression set, elongation, tensile and tear strength properties.

Listed are some of the applications for which HYPALON 40 is a candidate, citing in each case the specific advantages of using HYPALON 40:

BUILDING WIRE, MINE TRAILING CABLE, HEATER CORD, IGNITION WIRE

HYPALON 40 extrudes fast, smooth and glossy. Good colorability and color stability. Good abrasion, tear and tensile. Doesn't heat-soften. Good aging to 325° F. Electricals adequate for one-shot insulation-and-cover in services to 600v.

(A one-shot HYPALON 20 construction was just approved by Underwriters Laboratories for RHW and RHH building wire, and we see no reason why HYPALON 40 should not pass, too.)

GASOLINE HOSE COVER

Resistant to oil and gasoline. Extrudes fast, smooth and glossy. Colorability and color retention. Good tensile, tear and abrasion. Good weathering.

TEXTILE ROLLS

HYPALON 40 may be the all-purpose roll cover—resistant to all the oils and chemicals used in textile processing.

EXTRUDED SEALS (AUTOMOTIVE, ARCHITECTURAL, INDUSTRIAL)

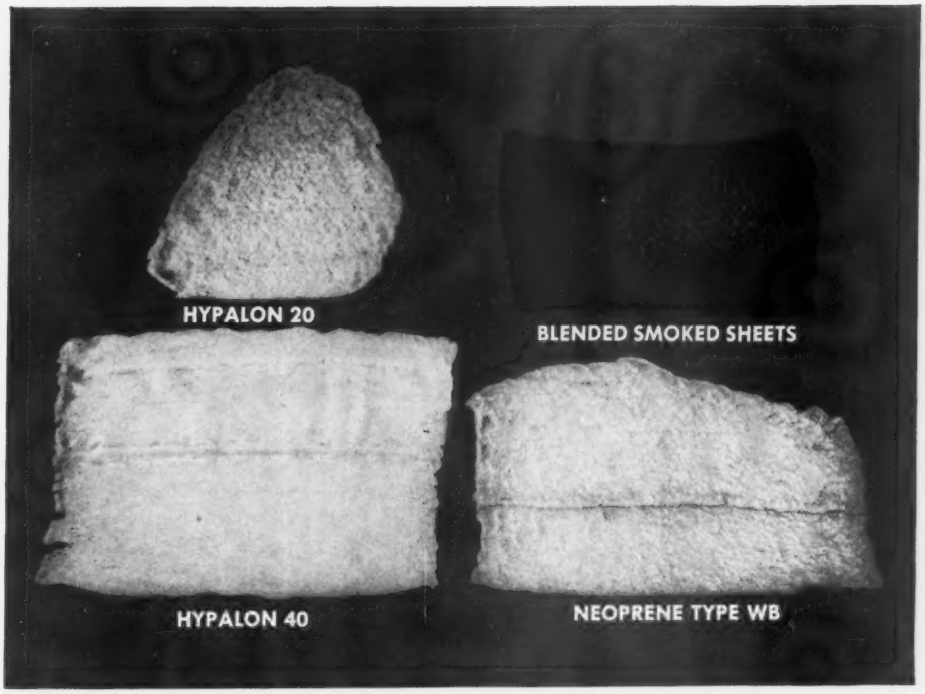
Good extrudability and compression set are important advantages in addition to colorability and resistance to weather, ozone and heat aging.

COATED FABRICS

Smooth calendered coatings down to 2 mils thick have been applied on 60-inch factory equipment at normal factory speeds—about 10 yd./min.

AUTOMOTIVE GOODS

HYPALON 40's big asset here is its resistance to the combination: oil, heat and ozone. Colorability, ease of processing and good physicals are added attractions.



Compare appearance of HYPALON 40 with other raw polymer samples of equal weight. These samples were milled 3 minutes at 100° F. roll temperature, removed at 0.050 gage.

LOADING	POLYMER	GARVEY DIE EXTRUSIONS
None	HYPALON 40	
None	HYPALON 20	
SRF Black—35 PHR Oil—8 PHR	HYPALON 40	
SRF Black—35 PHR Oil—8 PHR	HYPALON 20	
SRF Black—75 PHR Oil—8 PHR	HYPALON 40	
SRF Black—75 PHR Oil—8 PHR	HYPALON 20	

Compare the low die swell, the sharply defined profiles, and the excellent smoothness of HYPALON 40 extrusions.

More detailed information on HYPALON 40 *is contained in Report 59-2. If you are not on our technical mailing list and would like more information on* HYPALON 40, *please write to the Elastomer Chemicals Department, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.*

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SYNTHETIC RUBBER

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HYPALON®
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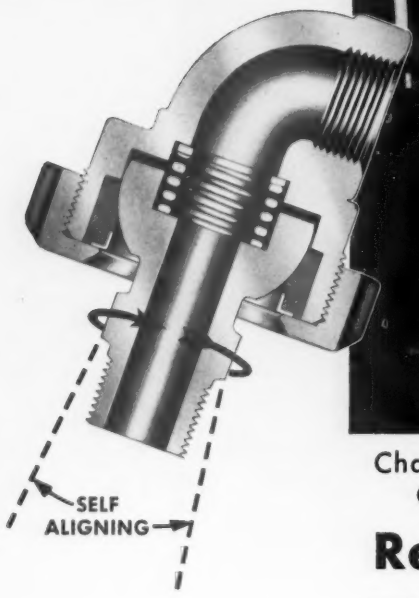
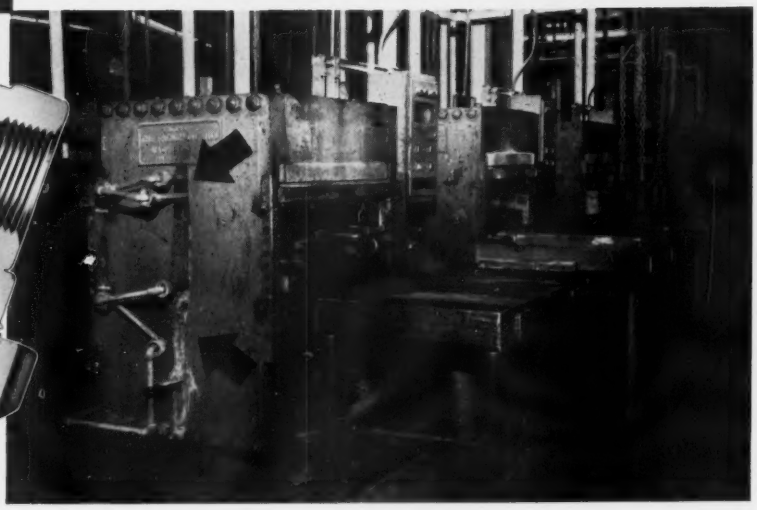
Better Things for Better Living . . . *through Chemistry*

BARCO *Self-Aligning* SWIVEL JOINTS





Chardon Rubber Co.
Chardon, Ohio

—Ends Hose Replacement Nuisance!

FORTY-THREE multiple platen presses running 24 hours a day and cycling every 3 to 5 minutes, 6 days a week, can add up to a BIG maintenance responsibility! In checking records, Alex J. Keller, Plant Manager, The Chardon Rubber Company, Chardon, Ohio, found he was having a continual series of emergencies with steam hose connections breaking unexpectedly.

Because of loss of time, loss of steam, loss of production, and cost of hose, Mr. Keller decided to make a test installation using Barco Type S Swivel Joints WITH NEW 11CTS TEFLON SEALS, and all-metal dog-leg piping. The test was a real revelation!

Today, Chardon Rubber Co. has all 43 presses equipped with Barco Swivel Joints. The piping is neater and more compact than hose. In three years' time, no blow-outs have occurred. There has been no maintenance time on the 387 joints since installation.

BARCO SWIVEL JOINTS ARE A GOOD INVESTMENT! FIND OUT ABOUT THEM NOW.

1. **IMPROVED SEAL**—Barco's new No. 11CTS gasket is amazingly long wearing! Does not bake hard. Ideal for steam and water service. Does not cause excess wear on other parts.
2. **LEAKPROOF, HOT OR COLD**—Joints stay tight regardless of pressure or temperature.
3. **SELF-ALIGNING**—10° side flexibility. This Barco feature saves piping time, cuts costs, and insures perfect performance.
4. **ENGINEERING RECOMMENDATIONS**—Send for a copy of Catalog No. 265C and installation drawing 10-52004.

SEND FOR NEW BULLETIN No. 265C

PRODUCTS BACKED BY EXPERIENCE
BARCO
FOUNDED 1918

BARCO MANUFACTURING CO.
5506 Hough Street • Barrington, Illinois

The Only Truly Complete Line of Flexible Ball, Swivel, Swing and Revolving Joints
In Canada: The Holden Co., Ltd., Montreal

new avenues of opportunity

for rubber compounders are opening now—thanks to a new triple-action chemical from GOODYEAR

Turn the page for all the facts—

Now- GOODYEAR Chemical

first truly effective combination of stabilizer, mixed diaryl-p-phenylenediamine for rubber compounders in

AUTOMOTIVE PRODUCTS

MOLDED GOODS

Here's why new Wing-Stay 100 can mean better products at lower cost—

As a stabilizer for SBR rubbers—

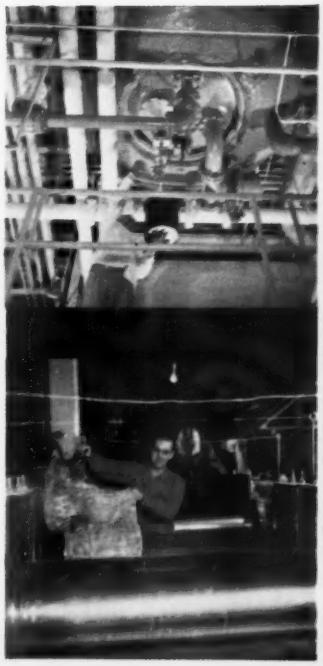
WING-STAY 100 offers these advantages in discoloring-type polymers:

1. Incorporates in much the same manner as phenyl-beta-naphthylamine.
2. Provides resistance to oxidative degradation and flex-cracking which is much above the accepted minimum level.
3. Is vastly superior to standard stabilizers in antiozonant activity.
4. Serves as a better stabilization building block at no extra cost.

As an additive for SBR rubbers—

WING-STAY 100 provides these advantages—as a combination antioxidant and antiozonant—in synthetic rubbers:

1. Incorporates easily
2. Does not accelerate the cure
3. Does not bloom at normal levels
4. Provides much better over-all protection at lower cost



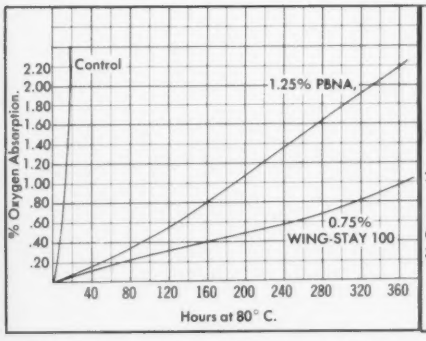
Division offers *Wing-Stay 100*

antioxidant and antiozonant. This nonvolatile opens **new avenues of opportunity** these major areas of application—

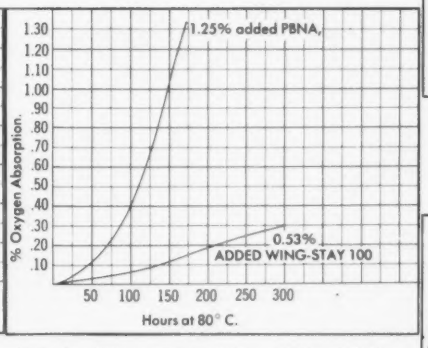
MECHANICAL GOODS

OR A VARIETY OF RUBBER PRODUCTS

Here's proof of new Wing-Stay 100 superiority—

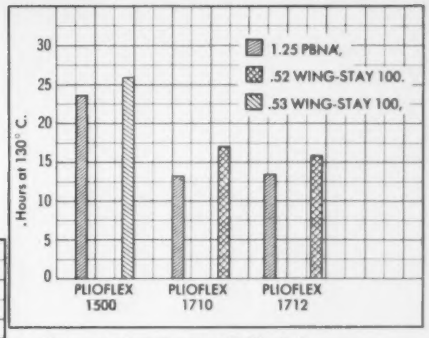


Effect of WING-STAY 100 on the stability of an Oil-Extended SBR Polymer.



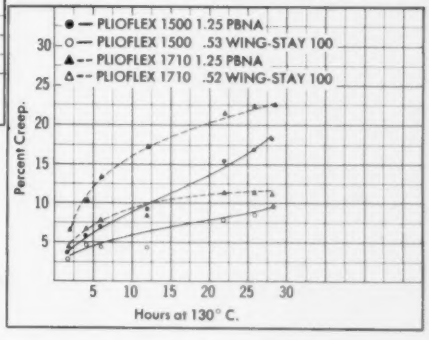
Effect of WING-STAY 100 as added stabilizer in a "cold" nonextended SBR Polymer.

Creep Test on PLIOFLEX Polymers.*



Vulcanized 50 Part HAF Black Compound—Hours to 10% Creep.

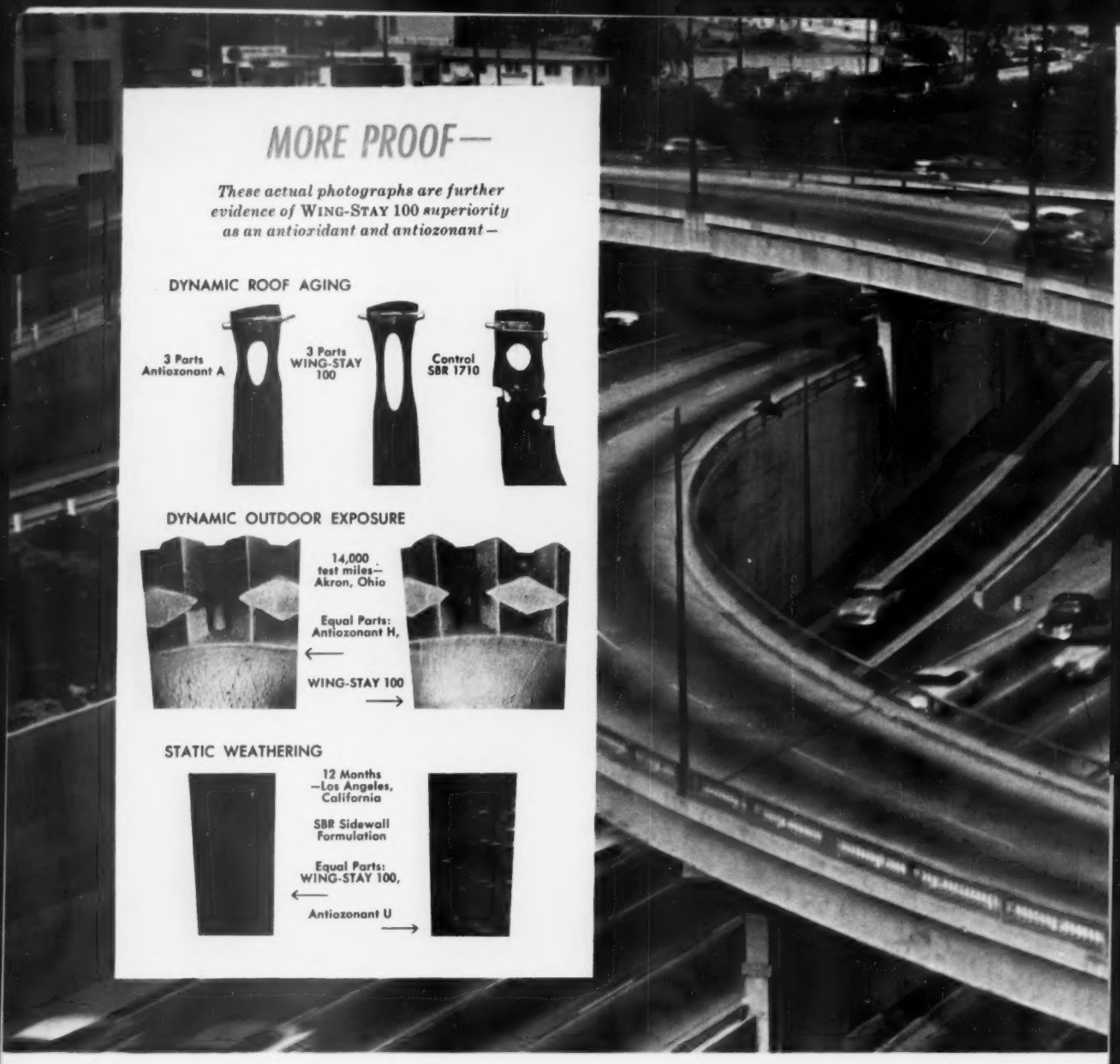
*A measurement of oxidative degradation of rubber in air at elevated temperatures.



Creep Test on PLIOFLEX Polymers. ▶

(Black Compounds containing Copper to magnify Oxidative Degradation)

And that's not all!


MORE PROOF—
These actual photographs are further evidence of WING-STAY 100 superiority as an antioxidant and antiozonant—
DYNAMIC ROOF AGING
3 Parts Antiozonant A
3 Parts WING-STAY 100
Control SBR 1710
DYNAMIC OUTDOOR EXPOSURE
14,000 test miles—Akron, Ohio
Equal Parts: Antiozonant H,
WING-STAY 100
STATIC WEATHERING
12 Months —Los Angeles, California
SBR Sidewall Formulation
Equal Parts: WING-STAY 100,
Antiozonant U

New Wing-Stay 100 is available now in 3 PLIOFLEX rubbers

THE GREATER PROTECTION of new WING-STAY 100 can be yours—as an already incorporated stabilizer—in three new PLIOFLEX rubbers:

Plioflex 1500C
a "cold" nonextended SBR

Plioflex 1710C
a "cold" SBR with 37½ parts of aromatic oil

Plioflex 1712C
a "cold" SBR extended with 37½ parts of highly aromatic oil

WING-STAY 100 is also available as an easy-to-handle flaked solid. Samples of WING-STAY 100 or of PLIOFLEX rubbers containing it—plus full technical assistance—are yours by contacting your nearest Chemical Division representative or writing:
Goodyear, Chemical Division, Dept. F-9419, Akron 16, Ohio

GOODYEAR
CHEMICAL DIVISION

Pliofiex, Wing-Stay—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

Vertical Continuous Vulcanizing

...a totally new concept in wire insulation

ANNOUNCEMENT TO THE INDUSTRY

Problems of transformation, scuffing, flattening and scoring in the curing of thick, spongy insulation have been eliminated by Vertical CV. Already in commercial use, Davis-Standard Vertical CV machinery delivers cable insulation of better concentricity, more uniform diameter and improved values in dielectric strength and corona level tests.

There are numerous advantages to drawing the insulated wire downward through the vulcanizing tube:

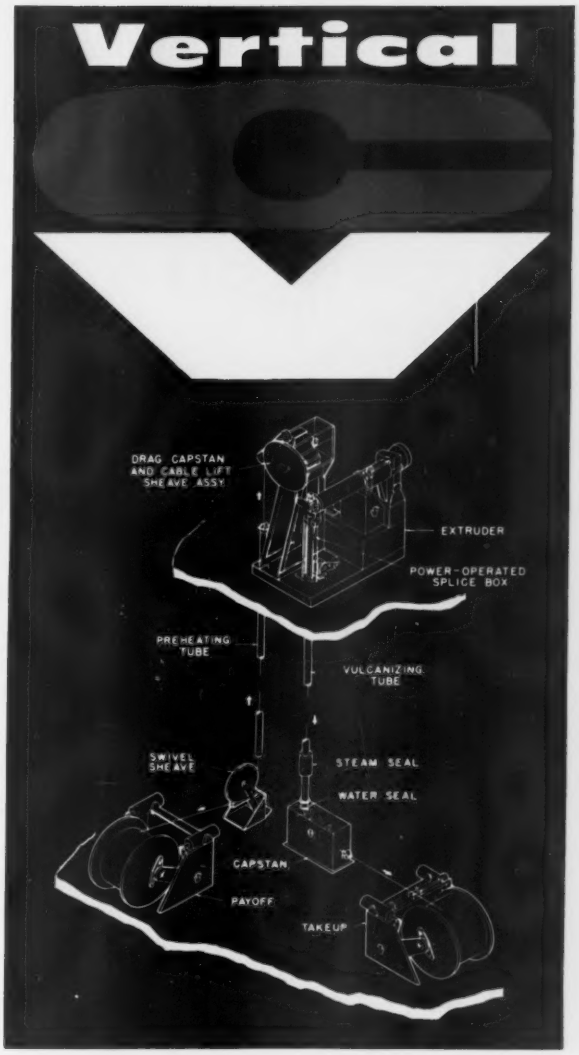
The easily damaged, uncured insulation does not come in contact with the vulcanizing tube until it has been vulcanized by steam and water.

The Drag Capstan, located above the Extruder, can be used to retract wire from the vulcanizing tube.

Vertical CV does not require the valuable floor space occupied by the conventional horizontal vulcanizing process.

Pay-Off, Capstan and Take-Up machinery are located on one floor for convenient reel-handling and operating adjustments.

The desirable feature of pre-heating the wire can be readily accomplished as it travels upward to the extruder.



*We are prepared to discuss the application of Davis-Standard's Vertical**CV** machinery to your wire insulating line.*

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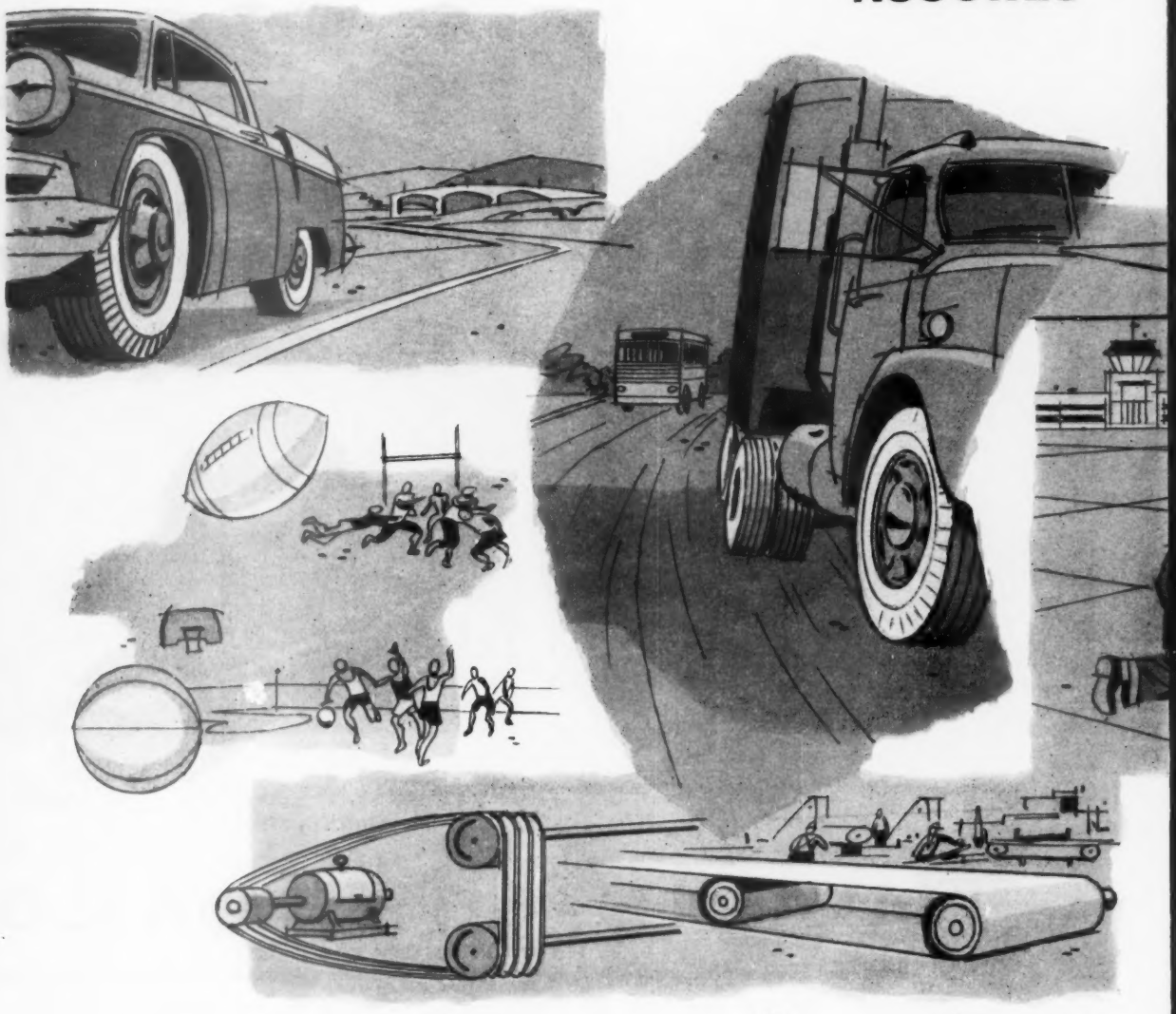
GEN-TAC

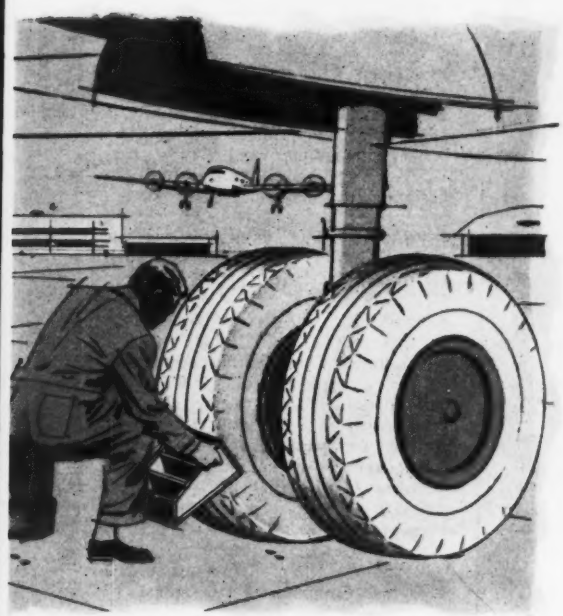
ASSURES



Creating Progress

the universally-accepted cord adhesive

MAXIMUM RUBBER-TO-FABRIC ADHESION



The rubber industry's problem of achieving better adhesion to meet today's high-speed needs is being solved everywhere by Gen-Tac. This unique vinyl-pyridine latex, added in minimum quantities to fabric dips, provides vastly superior bonds between rubber stock and rayon *or* nylon fabrics. Fabric thus treated assures improved fatigue resistance, reduction of curing blows, and fewer ply separations in service.

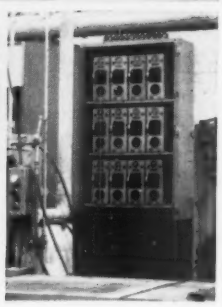
Manufacturers of airplane, truck, bus and passenger tires, V-belts, hoses, inflatable rubber products, and industrial goods in every part of the world have tested and adopted Gen-Tac as the truly universal solution to adhesion problems. If you manufacture rubber products containing fabric reinforcement, Gen-Tac offers a valuable contribution to product improvement.

Write for this new bulletin, packed with valuable information on Gen-Tac and the many advantages it affords.

THE GENERAL TIRE & RUBBER COMPANY
Chemical Division, Akron, Ohio

Through Chemistry

Chemical Division GENERAL
THE GENERAL TIRE & RUBBER CO.
GEN-TAC®



"FAULTLESS" CONTROL

system instrumented by Taylor-Emmett Controls, Inc.

The Faultless Rubber Co., Ashland, Ohio, recently installed a Taylor-Emmett control system on 22 of their presses. Small photograph shows 12 of the Taylor-Emmett ROBOTRON* Timers which control bumping cycles, curing time and press closing and opening.

This type of automatic control is new to Faultless Rubber, manufacturers of Drug Rubber Sundries, Gloves, Sponge Rubber Goods, Molded and Extruded Specialties, Foam Rubber Products. They are more than pleased with the resulting benefits:

- "Off-the-press" central control stations means more convenient access to working areas. This makes for better "housekeeping" and care of equipment.
- Press performance is now 100% predictable.
- Cycles can be set up in seconds.
- Since the entire sequence and duration of the cure is automatically controlled, each operator can handle a greater number of presses.
- Maintenance is easy, since the individual ROBOTRON Timers plug in . . . like a radio tube.

The ROBOTRON Timer is an accurate, dependable controller designed expressly for the rubber industry. Ask your Taylor Field Engineer, or write Taylor-Emmett Controls, Inc., Akron, Ohio or Taylor Instrument Companies, Rochester, New York.

*Trade-Mark

Taylor-Emmett Controls, Inc.
A SUBSIDIARY OF Taylor Instrument Companies

News in Brief

► Three formulations based on "Pliovic" resin blends are included in a four-page bulletin, Tech Book Fact 58-332, issued by the Chemical Division, Goodyear Tire & Rubber Co., Akron, Ohio.

► A new 40-page booklet, entitled "The Dispersion of Carbon Black in Rubber and Its Role in Vulcanizate Properties," can be obtained from the Instruments Division, Philips Electronics, Inc., 750 South Fulton Avenue, Mount Vernon, N. Y.

► Pertinent data on Hycar Polyacrylic Rubber is contained in a 34-page manual published by B. F. Goodrich Chemical Co., 3135 Euclid Avenue, Cleveland, Ohio. Ask for Manual HM-3.

► A 12-page brochure, entitled "Butyl . . . a unique elastomer for the wire and cable industry," is available from Thiokol Chemical Corp., 780 North Clinton Avenue, Trenton, N. J.

► U. S. Rubber Co., 1230 Avenue of the Americas, New York, N. Y., is offering a 16-page booklet which gives the facts of life on today's highways.

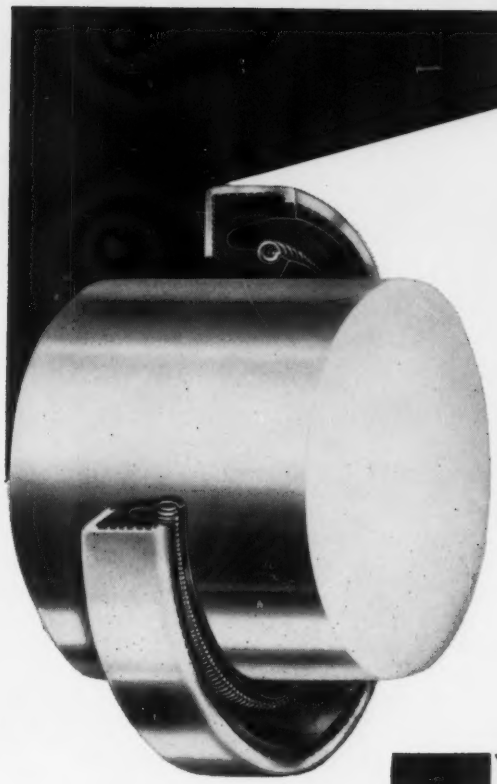
► Anchor Chemical Co. Ltd., Manchester 11, England, has issued two bulletins, Report No. 138/R/58 on "A. 7600 Pale Coumarone Resin in Rubber Compounding," and Report No. 139/R/59 on "Dixie 45 in Natural Rubber and SBR."

► "Flexzone 3-C" is described in an 18-page report issued by Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn. Ask for Compounding Research Report No. 43.

► Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has released five new reports: "NA-22-Thiuram M Curing Systems for Neoprene Type W" (BL-345); "Low Cost Neoprene Type WHV Compounds with High Clay Loadings" (BL-350); "Rigid Neoprene Compositions" (BL-351); "Oil Resistance of Neoprene Latex Compounds" (BL-352); and "Low-Water-Absorption Neoprene Compounds" (BL-353).

► Butyl Bulletin No. 8, entitled "Enjay Butyl for Mechanical Goods," can be obtained from Enjay Co., Inc., 15 West 51st Street, New York, N. Y. The company also has adopted a system for reporting information, released by its laboratories, as Technical Information Sheets, and has released Technical Information Sheets 1 through 23.

► Sprout, Waldron & Co., has announced the availability of an 8 page technical and illustrated booklet on storage structures and related materials handling equipment.



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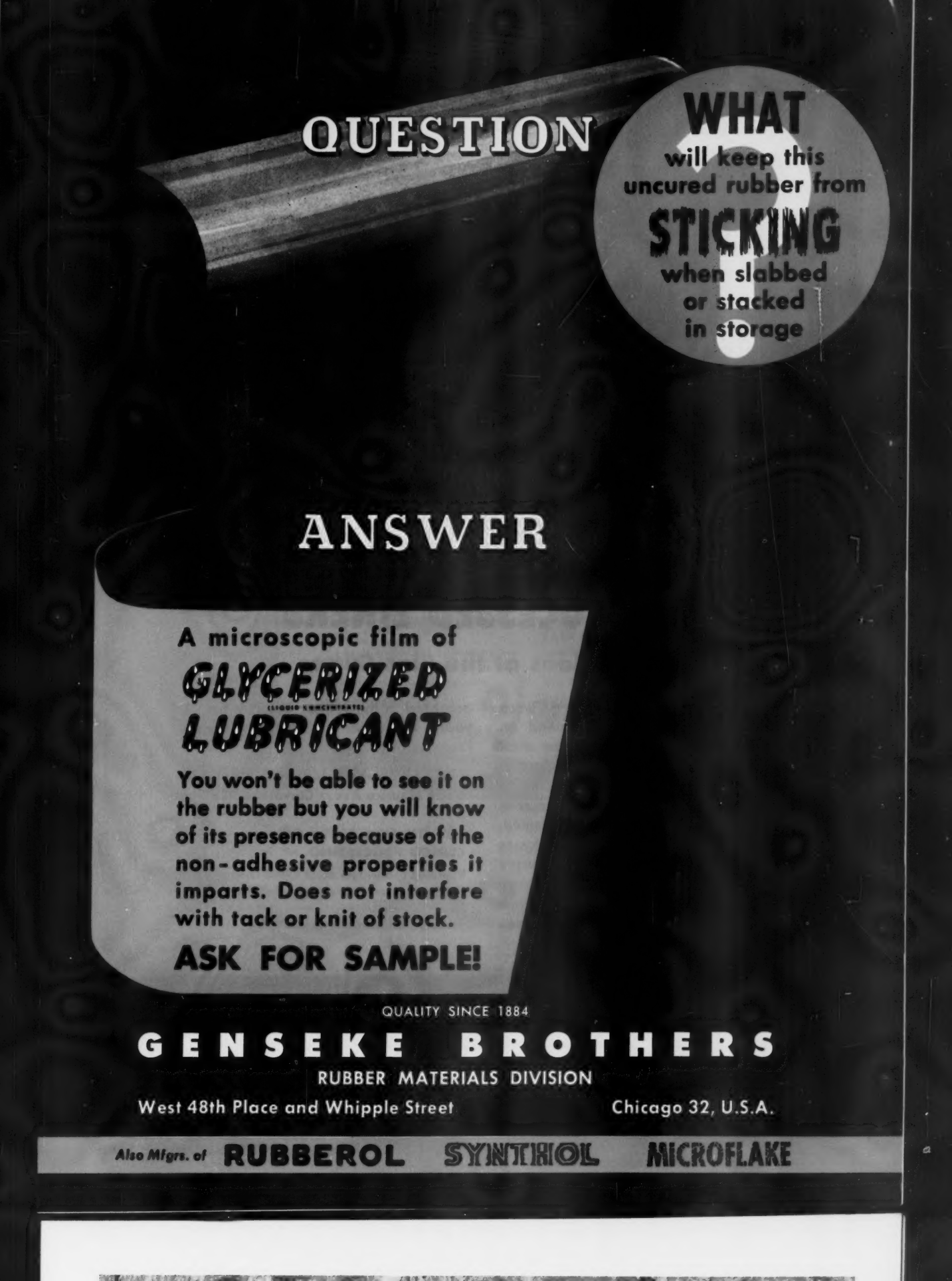
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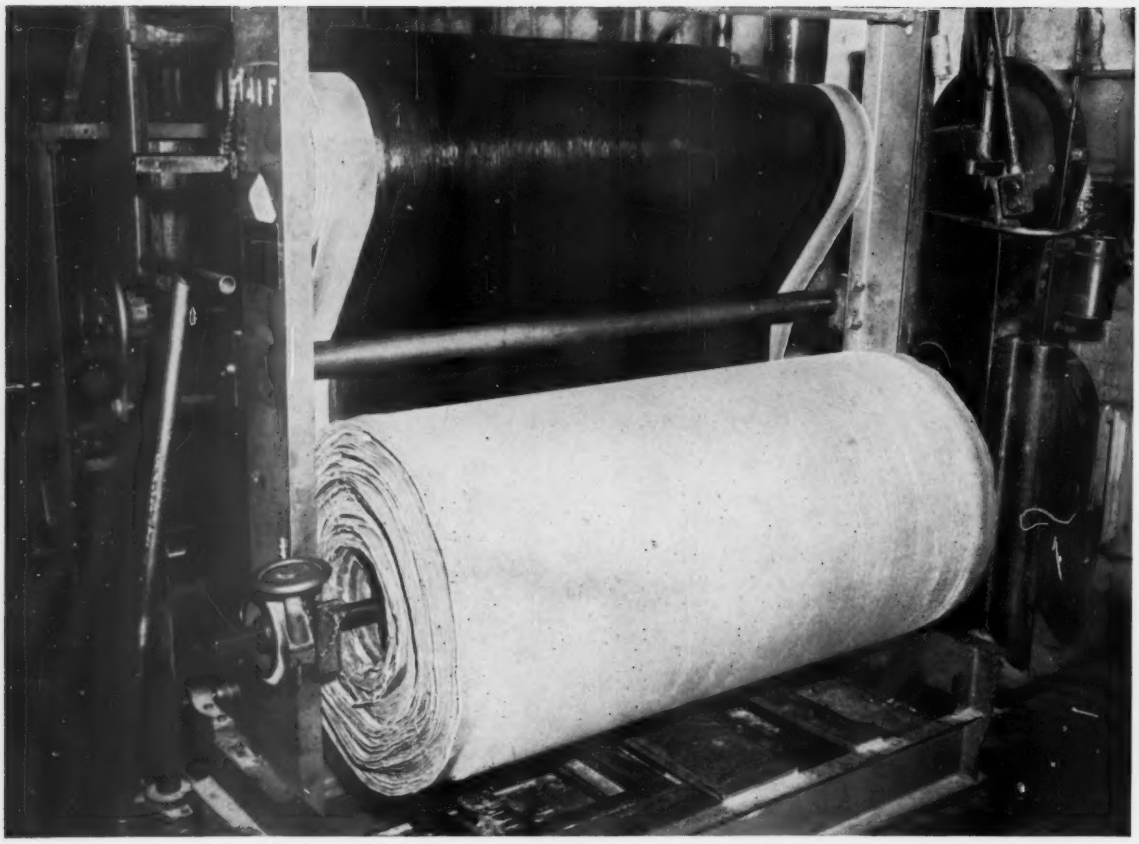

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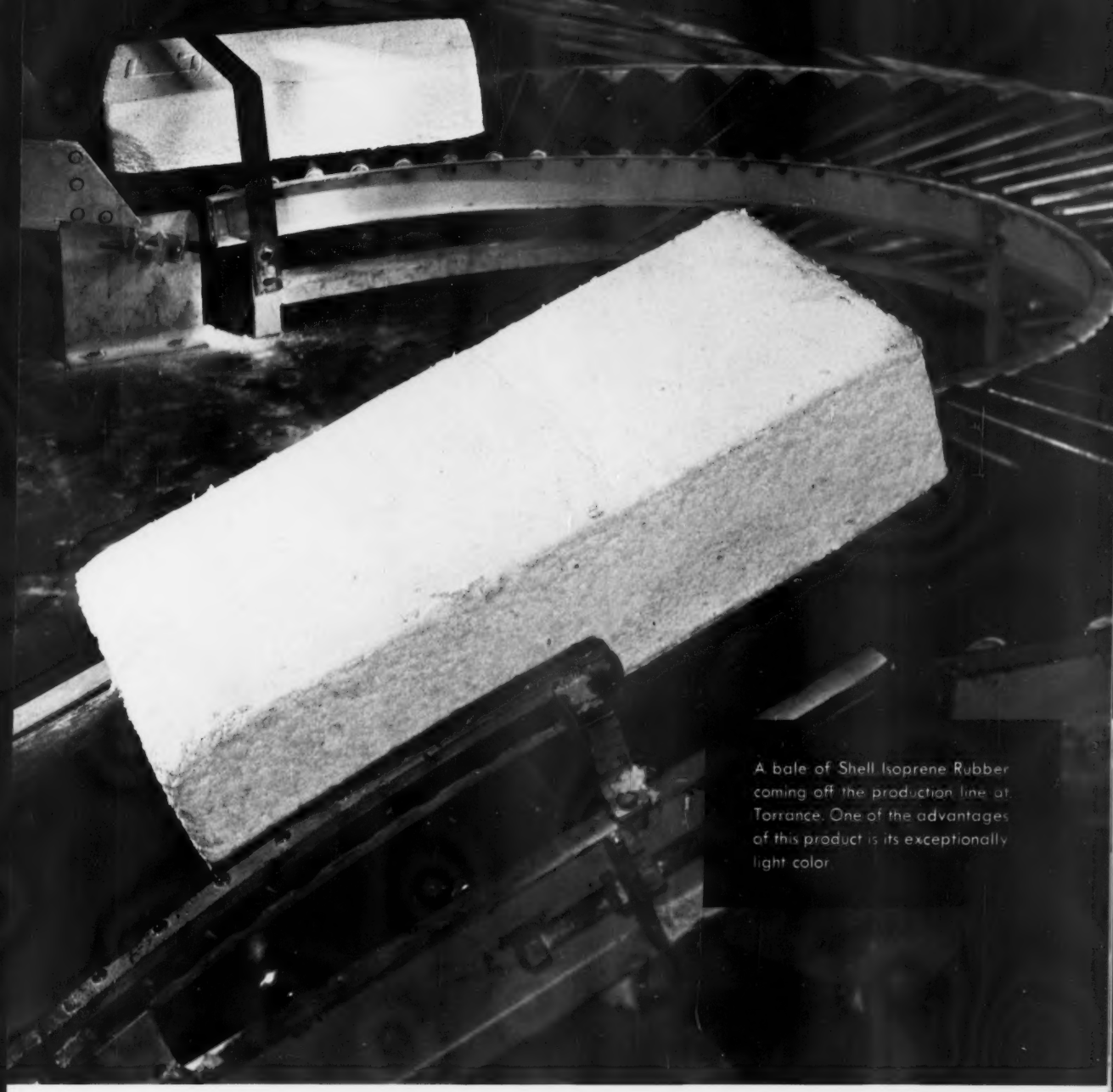

A bale of Shell Isoprene Rubber coming off the production line at Torrance. One of the advantages of this product is its exceptionally light color.

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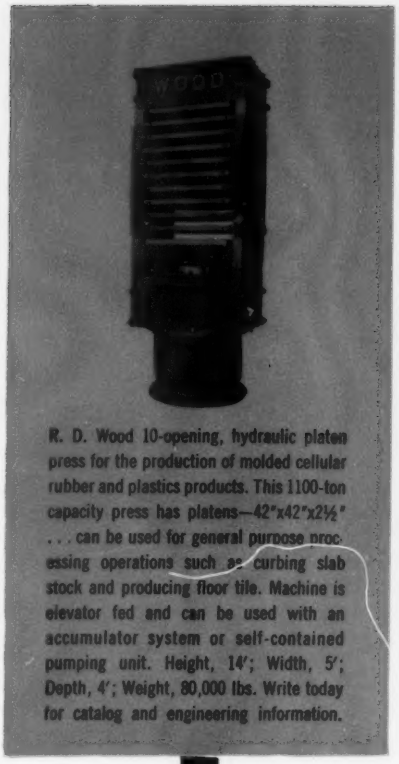

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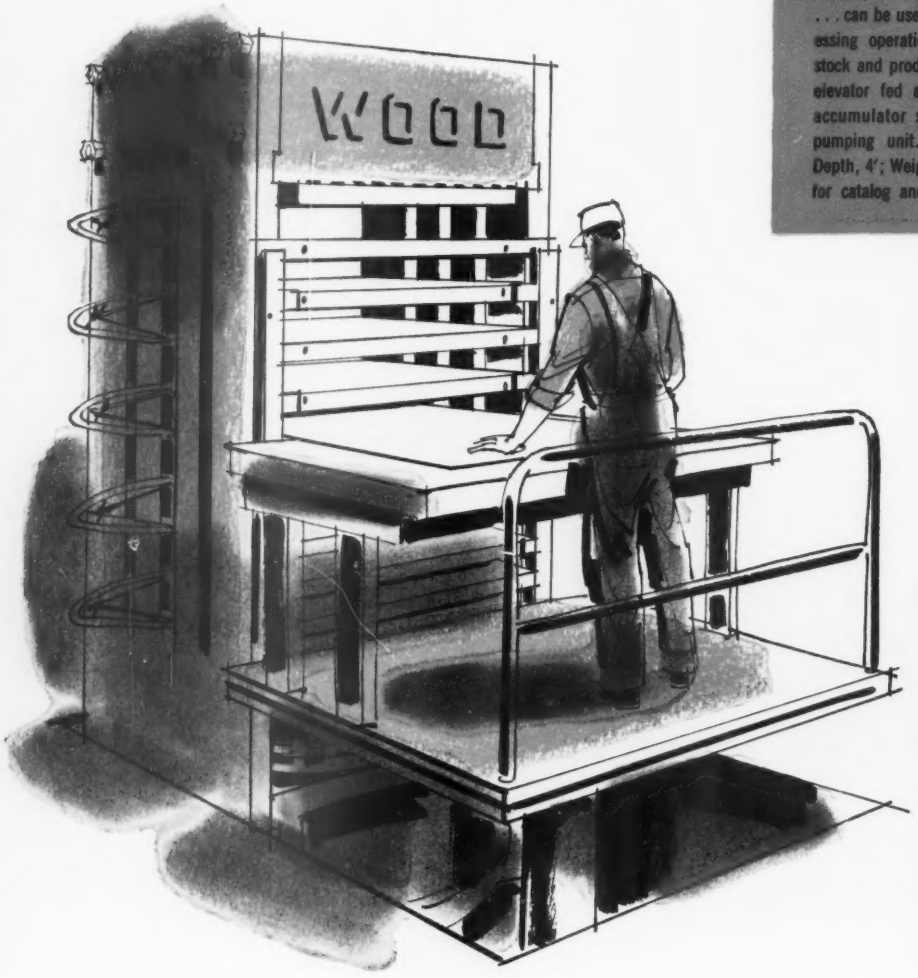

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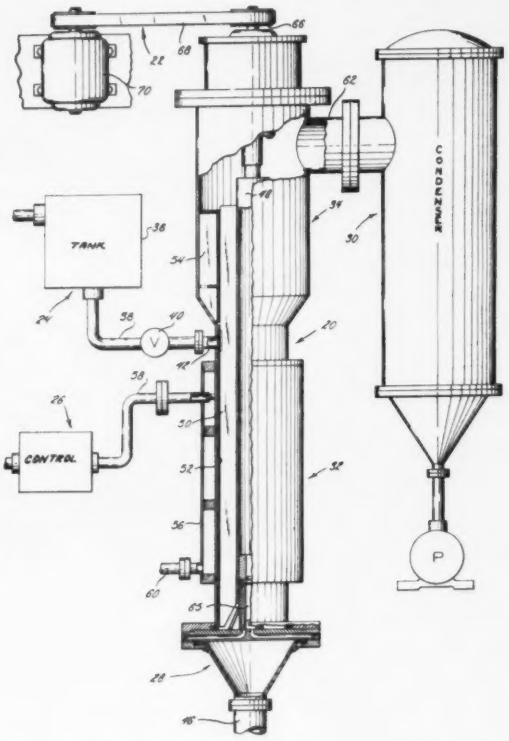
PATENT REVIEW

by Melvin Nord

Method for Concentrating Latices

U. S. Patent No. 2,857,962, issued October 28, 1958 to Douglas A. Rogers, assigned to Rodney Hunt Machine Co., describes a continuous method for concentrating latices by extremely rapid evaporation.



One of the difficulties encountered in previous evaporating concentrating processes stems from the concentration-viscosity characteristic of the common rubber latices. Under normal conditions concentration greatly increases viscosity. For example, at a concentration of 60% solids the latex is creamy and at a concentration of 75% solids it becomes a thick paste. In higher concentrations it tends to become a dry solid. The difficulty in mechanically handling latex in the higher concentrations has in the past prevented the development of a continuous commercially practical process for the concentration of latex by evaporation. It is for this reason among others that all prior evaporation processes have been batch processes.

As shown in the diagram, the apparatus em-

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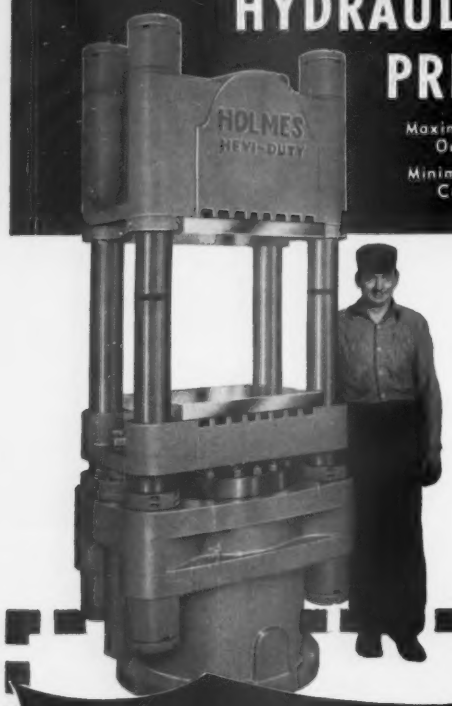

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HOLMES

PATENT REVIEW

ployed consists of an evaporator (20), an evaporator drive (22), a product feed system (24), temperature control apparatus (26) for the evaporator, a product outlet system (28) and a condenser vacuum system (30), all with appropriate interrelated controls.

The evaporator (20) includes a lower evaporator section (32) and an upper separator section (34). The liquid to be concentrated is introduced from the supply tank through a pipe (38) and control valve (40) to a fitting (42) located between the evaporator and separator sections. The liquid flows down through the evaporator section (32) by gravity, and the concentrate is withdrawn through a suitable product removal system such as a barometric leg (46). A rotor (48) extends vertically along the entire length of the unit and is provided with vanes (50) which extend radially outwardly into close proximity with the inner tubular wall (52) of the evaporator section. The clearance between the blades and wall may be 1/32-inch or more at relatively higher speeds. The outer edge of the upper portion of the vanes is disposed in similar close clearance relationship with a number of radially extending stator vanes (54) formed within the enlarged separator section (34).

The evaporator section is provided with a jacket (56) to which steam is supplied through a conduit (58) in amounts determined by the control apparatus (26). The condensate is removed from the jacket (56) through a conduit (60). A condenser (30) is connected to the evaporating and concentrating unit at a point above the evaporator section through a fitting (62).

Liquid latex is concentrated by first establishing a set of predetermined conditions of rotor speed, temperature and pressure within the evaporating unit. The required heating jacket temperature is established by adjustment of the control mechanism (26), the necessary vacuum is set through proper adjustment of the apparatus (30) and proper speed is set either by design of the rotor and drive, or by adjustment of the variable drive mechanism if one is provided.

When these conditions are established, the valve (40) is opened to permit the flow of the liquid latex into the evaporating unit through the fitting (42) at a suitable feed rate.

It has been discovered that latex flow conditions must be established before substantial evaporation takes place to avoid coagulation. If the full evaporation temperature and pressure conditions ar set prematurely, the film will coagulate, thus preventing flow and necessitating disassembly and cleaning of the machine. Accordingly, after the desired flow of latex is established, as evidenced by the flow of latex out of the bottom of the unit,

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the heating jacket temperature is raised to the desired operating value depending upon the vacuum and the character of the latex.

The liquid flows down the wall (52) by gravity and is forced against the heated wall by the rotor vanes (50) and forms a uniform thin turbulent film which is centrifugally held to the wall. The liquid latex thus describes a downwardly directed helical path through the section (32) and the concentrated latex flows out through the barometric leg (46).

As the liquid latex flows down the wall (52) vapor is driven off and passes upward in the spaces between the rotor vanes. The vanes strike droplets of foam or liquid entrapped in the vapor which is passing upwardly and drive these droplets outwardly against the wall (52) where they become a part of the film being processed. All of the vapor from the evaporating chamber (32) passes upwardly through the separating chamber (34) and any entrapped foam or liquid is driven outwardly in this section by centrifugal force toward the wall of the separating chamber and flows down the wall and the stator vanes (54) back into the evaporating chamber. The speed of rotation of the rotor and angular distance between the adjacent vanes is such that every part of the vapor passing through the unit is subjected to the action of the vanes.

Because of the extremely short processing time, many of the adverse effects previously associated with the heating of liquid latex and the consequent deterioration usually associated with the processing of the latices at elevated temperatures are avoided in the present method, and since the latices with which the present invention is primarily concerned are temperature-sensitive substances, superior concentrates are provided even where the concentration is carried to a point hitherto unobtainable.

Production of Foam Rubber

U.S. Patent 2,845,659, issued August 5, 1958 to Kenneth O. Calvert, assigned to Dunlop Rubber Co., Ltd., describes a method of making foam rubber.

It has been found that in many cases the step of heating the shaped and gelled foam in order to vulcanize it has the unfortunate effect of causing the vulcanized foam rubber product to be loose or feathery in structure, or even to split, that is to say, to develop fissures. It is an object of the present invention to provide a method of making foam rubber in which looseness of structure and splitting are prevented or at least reduced.

According to the invention, foam rubber is

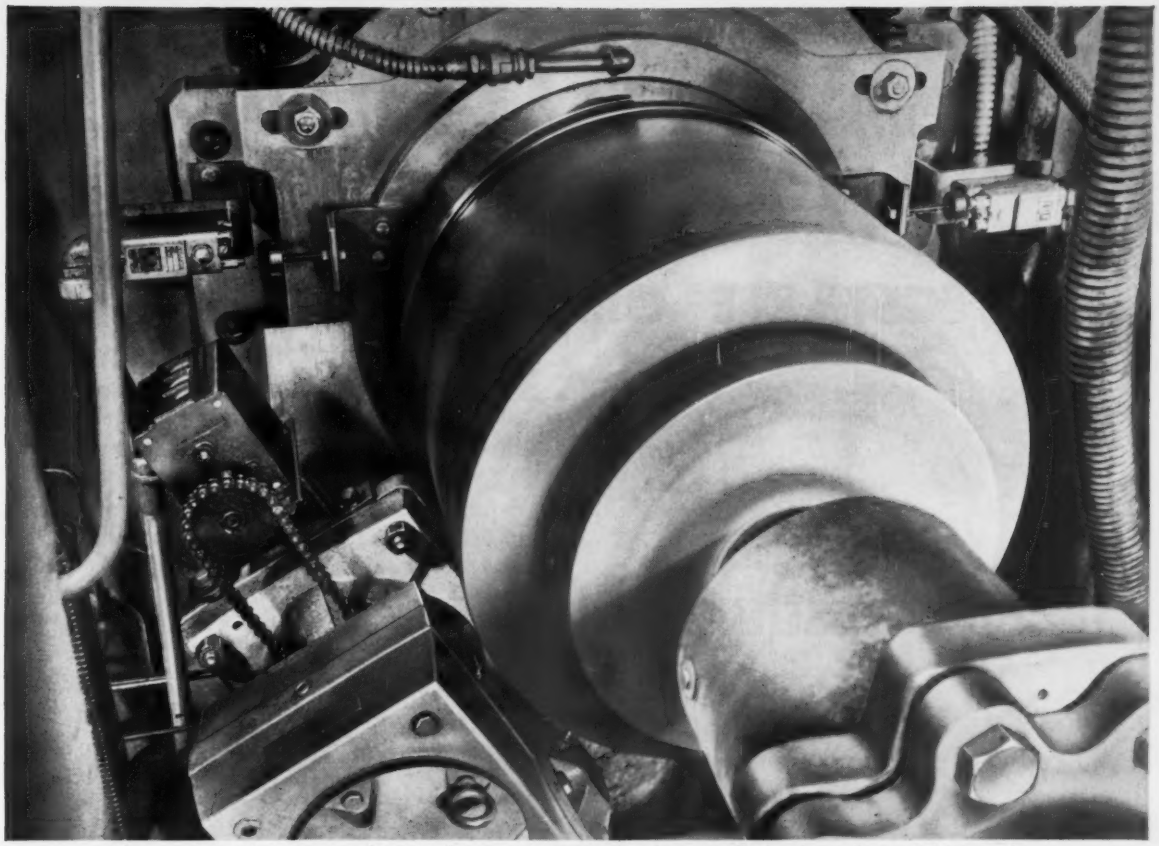

Photo and drawing show application of crown compensator to bottom roll of a four-roll inverted L calender.

Farrel crown compensators prove their efficiency on existing calenders

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Send for further information about this important new development. Ask for folder A58-DM9 which describes the crown compensator in detail.

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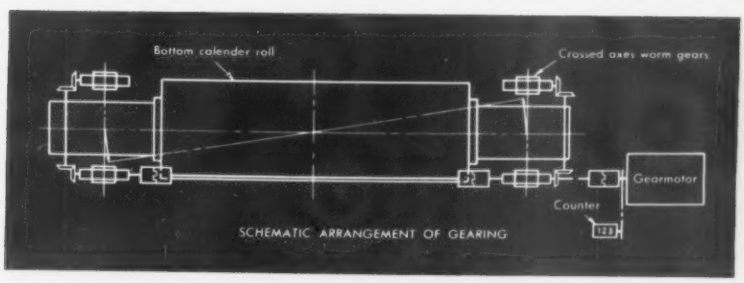

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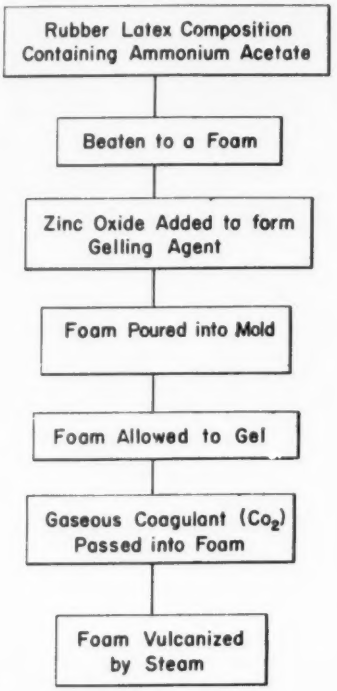
PATENT REVIEW

made by a method in which a vulcanizable compounded rubber latex is foamed, the foam so formed is shaped and then gelled by means of a


Rubber Latex Composition Containing Ammonium Acetate
Beaten to a Foam
Zinc Oxide Added to form Gelling Agent
Foam Poured into Mold
Foam Allowed to Gel
Gaseous Coagulant (Co_2) Passed into Foam
Foam Vulcanized by Steam

non-gaseous gelling agent, and the shaped and gelled foam is treated with a coagulating gas and vulcanized. The method is shown diagrammatically in the schematic.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Vehicle tire construction	Lee Rubber & Tire Corp.	2,850,066	9/2/58
Tire winterizer	Goodyear Tire & Rubber Co.	2,850,094	9/2/58
Ozone inhibitors for diolefin rubbers	B. F. Goodrich Co.	2,851,438	9/9/58
Purification of isoprene	Gulf Research & Revelopment Co.	2,851,505	9/9/58

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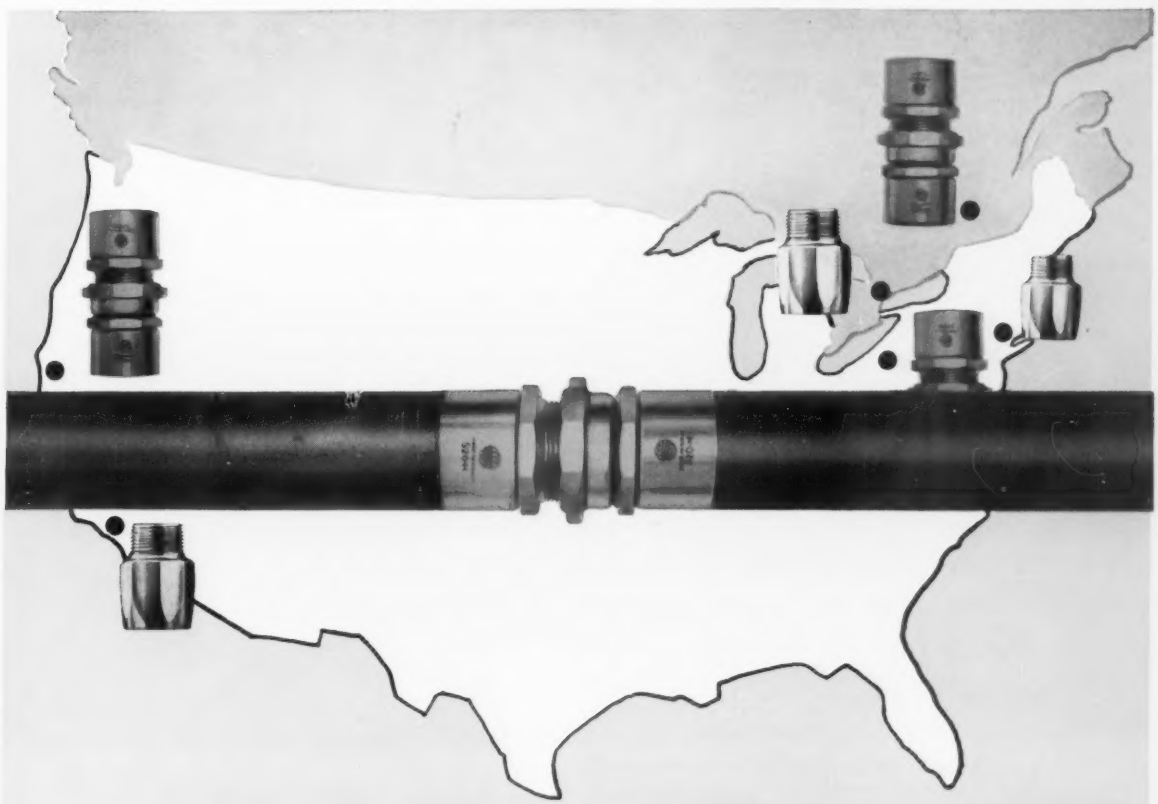

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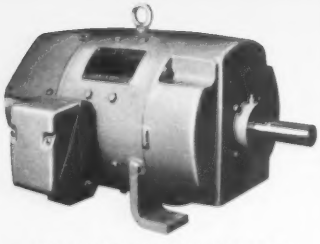

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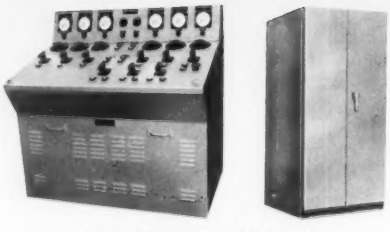

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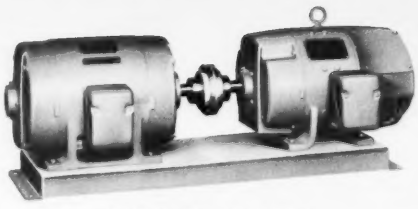

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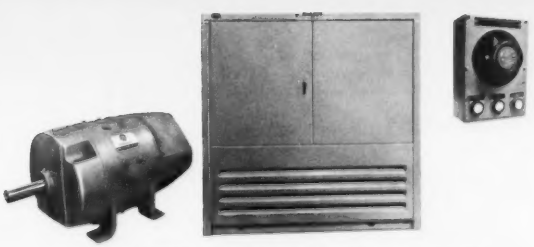

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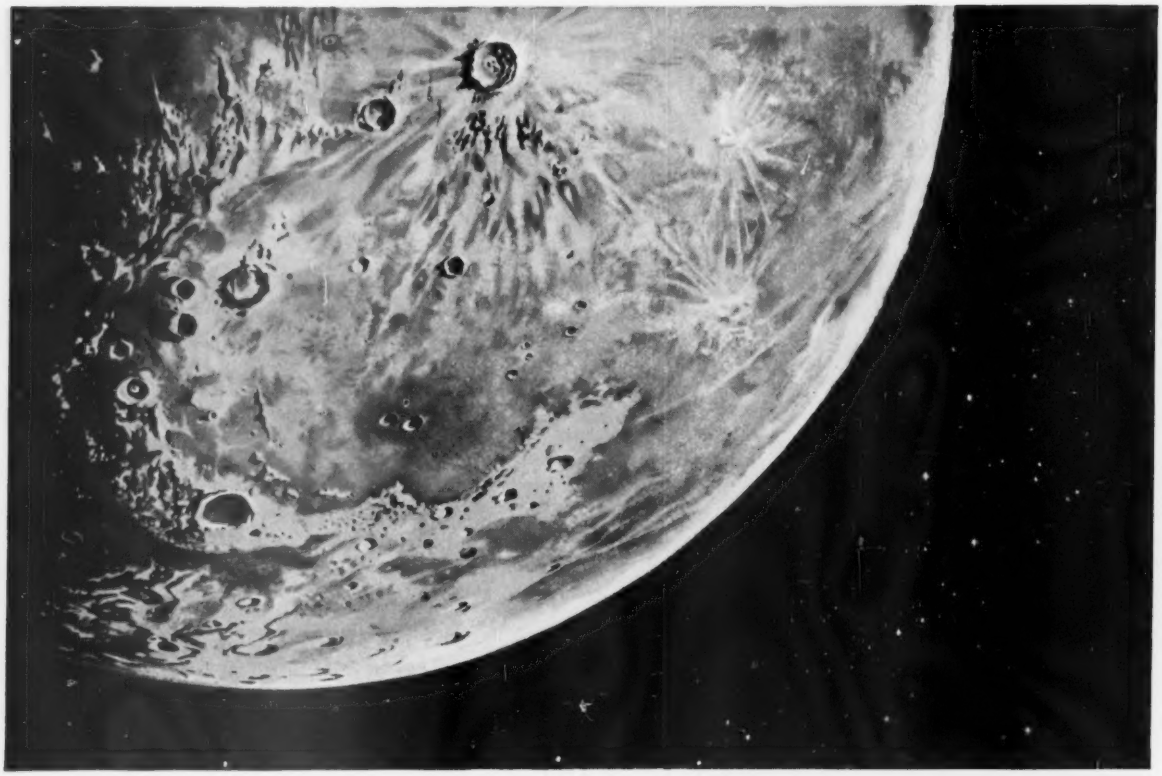

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White sidewalls stay white, not only because Johnny, despite Fido, cleans them, but because of modern compounding. Judicious selection of polymer, accelerator and antioxidant enables modern compounding and processing to build *lasting whiteness* into whitewalls

Why white sidewalls stay white

through pigmentation with TITANOX-A *anatase titanium dioxide.* This is the titanium dioxide of proven uniformity of whitening power for whitest whites of constant whiteness and durability in whitewalls.

Although critical whiteness calls for TITANOX-A anatase titanium dioxide, this does not exclude the stronger rutile TITANOX® pigments. For minimum loading of white and tinted stocks and maximum opacity in thin stocks, due to some 25% -or-higher tinting strength, TITANOX-RA (rutile titanium dioxide) is widely used. Similarly TITANOX-RA-50, combining exceptional ease of dispersion with high tinting strength, is preferred in many compositions. This pigment, as well as the "non-chalking" TITANOX-RA-NC, contributes to weather resistance. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities.

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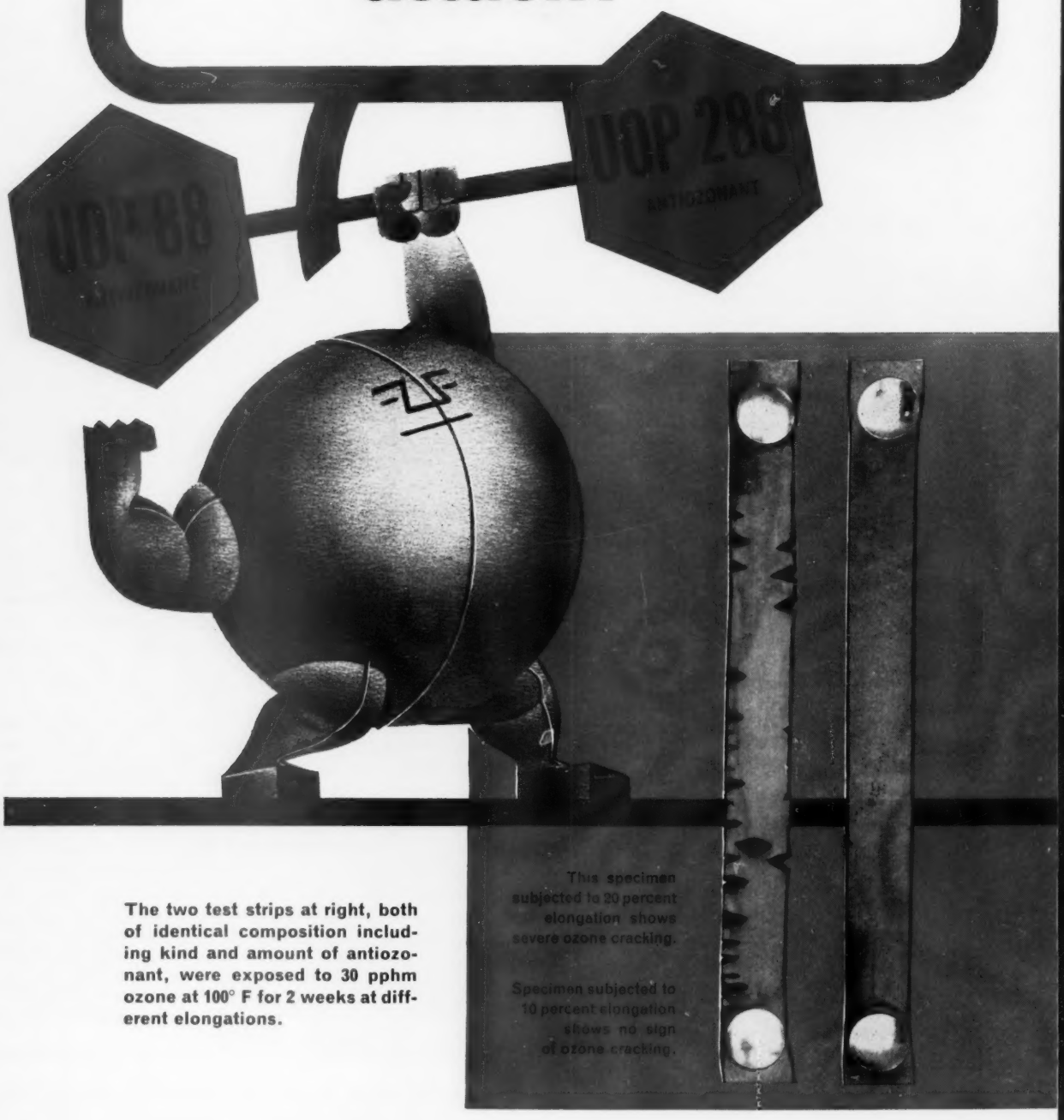
6712

how can rubber under STRESS fight off ozone attack?


UOP 288
ANTIOZONANT
UOP 88
This specimen subjected to 20 percent elongation shows severe ozone cracking.
Specimen subjected to 10 percent elongation shows no sign of ozone cracking.

The two test strips at right, both of identical composition including kind and amount of antiozonant, were exposed to 30 pphm ozone at 100° F for 2 weeks at different elongations.

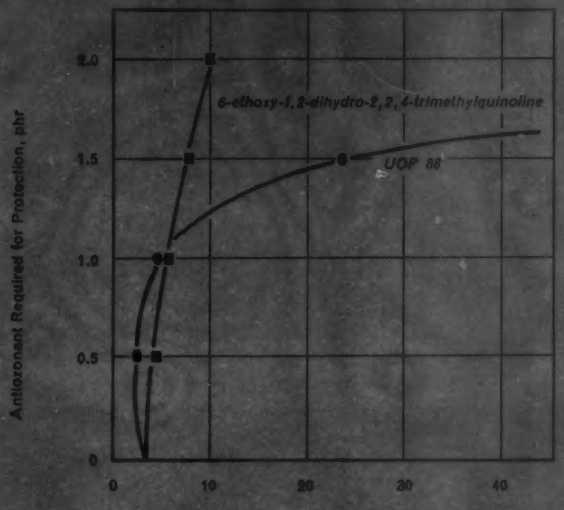
properly formulated, rubber can withstand ozone, even under severe dynamic service . . .

What happens to a well formulated rubber compound when the vulcanized product is subjected to inherent or applied stresses?

The photos of test strips below give a graphic answer: Ozone attacks the surface of the product and severe cracks develop.

Hence the need for special ozone protection in products likely to be subjected to such service. And special protection means the kind provided by UOP 88 and 288. Unlike other protective measures, UOP antiozonants extend their protection to products under heavy physical stress and dynamic flexing. With a relatively small increase in amount, you can give your product sufficient ozone protection to withstand greatly increased stresses.

In working out rubber formulations involving the use of antiozonants avail yourself of UOP technical service and facilities. Just write or telephone our Products Department.



Curves plotted for UOP 88 and a competitive antiozonant show that while antiozonant requirement increases with increased strain, it does so at a far lower rate for UOP 88 than for the competitive material.

To cover all phases of service conditions, UOP rubber labs conduct dynamic and static tests both indoors and outdoors:

DeMattia flexer is used to evaluate flex-cracking properties of compounds tested in UOP rubber laboratory.

UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

Test specimens mounted on outdoor racks are examined at regular intervals for evidence of deterioration.

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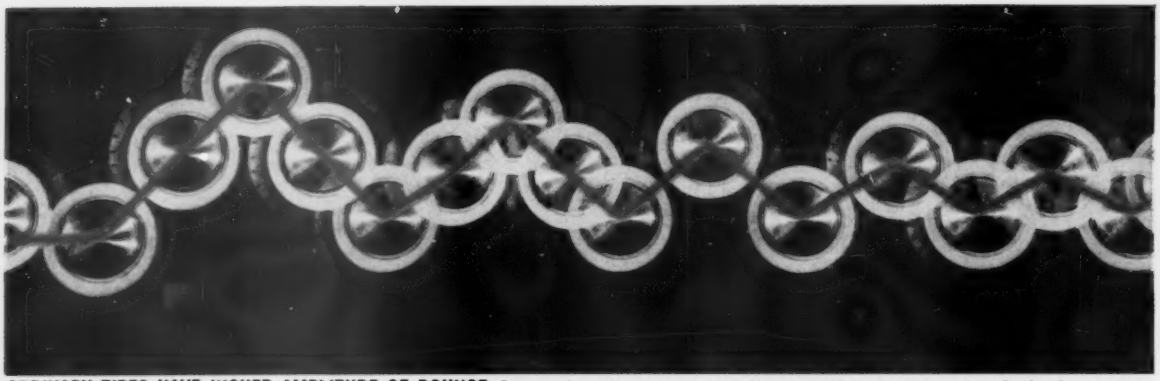
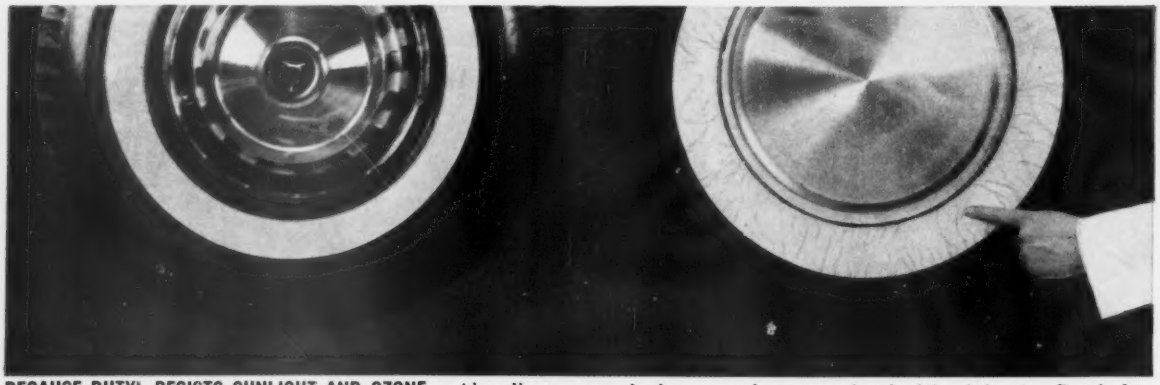
NOW! "SCREECH-FREE" TIRES...



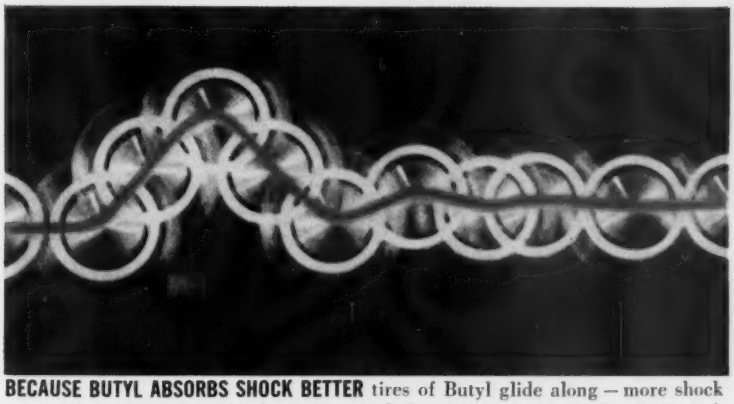
ORDINARY TIRES HAVE HIGHER AMPLITUDE OF BOUNCE. Lower damping factor of ordinary rubber does not absorb shock at point of contact, imposes greater load and wear on suspension system.

GRIP THE ROAD SO WELL THERE'S NO TIRE SCREECH. At any corner, at any stop, at any speed Butyl tires refuse to squeal — even on hot pavements. Offer an outstanding selling feature for new cars.



BECAUSE BUTYL RESISTS SUNLIGHT AND OZONE — sidewalls stay smooth, do not crack or craze for the life of the tire. Butyl also offers superior resistance to heat, flexing and tearing.

MADE OF BUTYL RUBBER



BECAUSE BUTYL ABSORBS SHOCK BETTER tires of Butyl glide along — more shock energy is absorbed. Even the thumping sound of road seams is practically eliminated.

BECAUSE BUTYL GIVES BETTER TRACTION — tires of Butyl stop up to 30% quicker . . . even stop faster on wet pavements than other tires do on dry.

TESTED FOR MILLIONS OF MILES. Butyl tires have been thoroughly tested everywhere by motorists, technicians and by the military.

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From Enjay comes a new range of Butyl compounds for automotive tires permitting new tread design and tire construction features. These new design ideas and Butyl present an opportunity not often found to come out with a tire of unprecedented silence, shock absorption and traction.

Because Butyl absorbs shock better, tires of Butyl eliminate or at least *minimize the need for structural improvements* to reduce vibration and noise. One set of Butyl tires will literally upgrade the ride of any car . . . making it ride like cars costing much more. So effective is their traction, they *stop up to 30% quicker than other tires.* Because of these unique features, Butyl tires offer *unusual promotional possibilities,* promise to be a big selling point on tomorrow's new cars . . . also offer an equally promising future in the tire replacement market.

Tires of Butyl are now distributed in a major Eastern marketing area. Do you have the *latest* information on the rapid development and consumer acceptance of this remarkable new tire? Contact the Enjay Company for further facts on new test reports, findings of consumer research studies, and other valuable information. We stand ready to provide technical assistance on request.

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(Based on an actual conversation between a Du Pont Representative and a customer.)

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capitol cues

A STEEL STRIKE STILL CAN'T BE RULED OUT this Summer, despite all the pressure being brought to bear on both sides by the President and Congress. The union is asking for a big package and says it won't take less than its members need. The companies don't want to be criticized for yielding without a fight. So officials see a deadlock and a strike lasting four to six weeks.

As a result of a strike, the union probably will get a hike in pay of about 10¢ per hour, plus fringe increases for such things as pensions, health insurance, etc. The new contract may run for three years. And despite Eisenhower's pressure, the mills can't absorb the added cost. Prices will rise 2-5%.

If a strike does begin early in July, steel in users' hands will total about 20 million tons, up 8 million since the first of the year. But that's not enough to carry most users past a four-to-six week strike. Some buyers are finding it hard to get the supplies they want this Spring. Shortages of transportation facilities have added to the difficulties.

THERE HAVE BEEN BIG PRODUCTIVITY GAINS in manufacturing in recent months, according to unpublished calculations of some government agencies. Output per manhour in the first quarter of this year was 7% greater than in the same period of 1958. (That's for all workers; for production workers, alone, the rise was 6%—meaning more line people than overhead employees were put on to handle extra business.) Economists say that increases of this magnitude are entirely normal for the first year of a business upturn.

Rising productivity will be a big issue in steel negotiations and other collective bargaining this year. The recent gains will get the spotlight even though increases will be smaller later on, as industry moves back closer to full capacity.

A NEW, ALL-OUT BOOM IN BUSINESS BY YEAR-END is being predicted by some economists. Thus far, this is merely a minority view; most experts don't see anything but a slow, steady rise in activity. The optimistic analysts are impressed with the way business is picking up all along the line. They don't believe that a steel strike, if it comes, would slow business down very much.

The boom-minded experts look for total output of services and goods to reach a $500 billion-a-year rate by the end of 1959—a gain of 5%. (It's now $470 billion-plus, 4% over the pre-recession peak of mid-1957.) For this target to be reached, there'll have to be big increases in inventories, in spending for new plant capacity, in consumer spending—and in prices.

Most economists in business and government expect business to fall $10 or $15 billion short of the half-trillion-dollar mark by year-end. While they look for steady upward gains in business, they don't expect a new boom before '60 or '61.

capitol cues (cont'd)

CANADA'S BUSINESS RECOVERY IS SLOWER than the upturn in the U.S. Normally, the cycle for our northern neighbor follows ours pretty closely. Its economy is tied to ours because we're its best customer—and by far. But this cycle is different because we are taking less of its oil, metals, and farm products—and these are the mainstays of the Canadians' economy.

- Industrial output is up 4-5% from the low, against 14% here.
- Employment has gained 2-3%, a little less than in the U.S.

Despite lags, Canada's economy will reach new highs in 1959.

A BOOST OF 4% TO 5% IN LUMBER PRICES is likely this Summer. Demand is strong, reflecting high rates of home-building; and dealers are trying to build up stocks. Meanwhile, lumber supplies are tightening. Some large mills are telling customers there will be delays in delivery. Small mills are feeling a pinch on logs. Bad weather slowed logging in many sections. The higher lumber prices, in turn, will force up the prices of new houses.

A TIGHTER REIN ON DEFENSE PROFITS OF SUBCONTRACTORS is on the way. Prime contractors will soon be under pressure from the Pentagon to see if they can cut back on the margins allowed their suppliers. The Pentagon is finding it more difficult to fit procurement costs into the Budget. And a committee of Congress is pushing the big contractors to take a searching look at suppliers' bills. Despite all of the talk, however, there probably won't be a uniform limit on margins. Pressure will be applied case by case.

The Senate Small Business Committee, at the same time, wants to figure out a way to force the prime defense contractors to give more work to small subcontractors. The share now going to smalls is down to 17.4% of all subcontracts, from 21% in '57.

WHAT BUSINESS RECORDS TO KEEP—AND FOR HOW LONG? This is a question that always arises after the figuring is finished and tax returns are filed. But it also plagues business at all seasons as required paperwork multiplies. Yet papers that have outlived need only fill space and create fire hazards.

Checks with government agencies reveal these guidelines:

- State and federal tax forms—Keep your returns for 6 years.
- Canceled checks—Hold for at least 6 years, 10 if possible.
- Payroll records—Keep 3 years; hold pension data permanently.
- Audits, ledgers, stock transfers—Keep these permanently.
- Shipping, billing, and job tickets—Destroy after 2 years.

IF YOU'RE LOOKING FOR A HIGH YIELD on an investment, you might well consider municipal bonds. With yields on stocks now so low, the tax exempt income of municipals can be attractive for middle-income investors. Though nominal interest rates only range from 3% to 4%, an investor in the $20,000 bracket will get as much as from a taxable security paying 6½% or even more. For people with higher incomes, the after-tax yields are even greater.

THIS WILL BE A BIG YEAR FOR SPORT FISHING, say government experts. The fish supply will be the best ever—trout, bass, and catfish, especially. Best spots will include coast waters, the Tennessee and Cumberland valleys, and the Alabama lakes. Catches may not be good in the drought-hit sections. Fishermen will spend nearly $3 billion for transport, tackle, and licenses.

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SHOE SOLES & HEELS	Extreme resistance to wear, weather and moisture • exceptional dimensional stability • controlled "blow" in cellular stocks.
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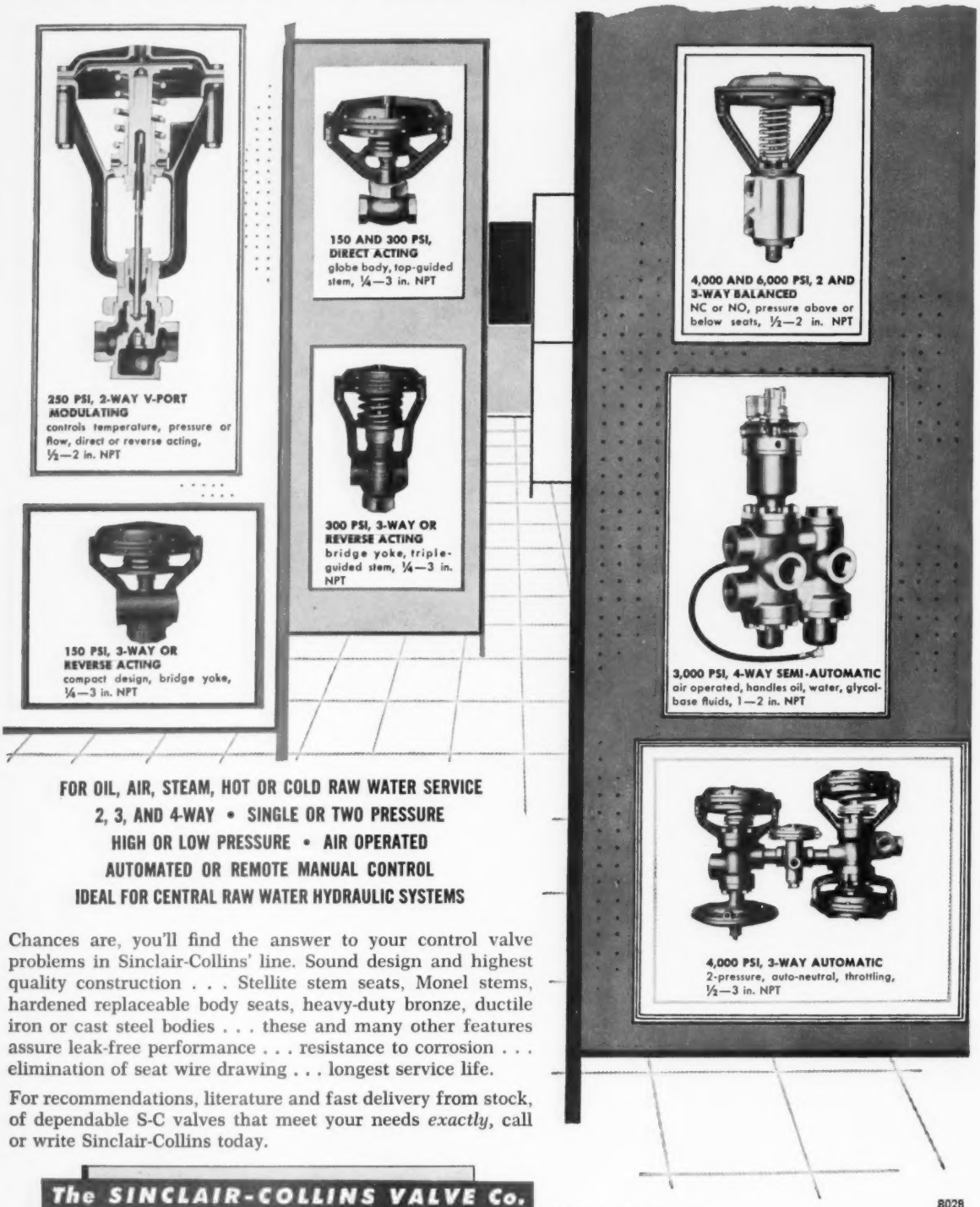
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• India has introduced the metric system in a number of major industries and expects to extend its use gradually until the system is adopted by the entire country. As the United States will have to cope with the same problem in the future, we would like to describe what the Indian government has done to facilitate introduction of the metric system.

Indian manufacturers and traders may face many problems during the change-over, ranging from labor training to product design and suitable publicity for new products conforming to metric dimensions. The Indian Ministry of Commerce and Industry is aware of these problems and publishes a journal called *Metric Measures* in order to disseminate useful information and suggest ways and means of tackling the problems. Published every two months, the journal gives information on various aspects of the metric reform and includes articles by experts in different fields. It is the only journal of its kind in India and is a must for every industrial concern. A Hindi edition, called *Metral Maaptol* is also published bimonthly.

• Test production of synthetic alcohol from waste gases in the manufacture of petrol and oil has started in the vicinity of the former border town of Aussig on the Elbe, in the northern part of Czechoslovakia, according to a report issued by the Czechoslovakian news agency, Ceteka. The agency says that construction of a factory for the production of synthetic alcohol is planned. The alcohol will be the main raw material utilized for the manufacture of synthetic rubber. If this information is true, then the observer of Czechoslovakian events wonders why the government did not use a much better opportunity for producing alcohol by using facilities in Pressburg, a little town located about 60 miles east of Vienna on the Danube.

In Pressburg, Czechoslovakia has an excellent crude oil refinery which was organized around 1900 and which could fulfill all the production requirements of the Czechoslovagian economy. In addition, raw materials and manufactured products could be shipped by water on the Danube instead of by railroad through the narrow valley of the Elbe.

• A crude oil refinery will probably be built by the Swiss in the valley of the Rhone. Under consideration is a plan to pump the crude oil from the port of Genoa to the Swiss refinery by means of a pipe-line through a tunnel, now under construction, through the Grand-St. Bernard mountain. Later on, this pipe-line may be extended to the borders of West Germany.

• The automobile tire manufacturing industry in India consists of two units. One of these, the Dunlop factory in Sahaganj, near Calcutta, accounts for some 60 per cent of total production of tires of all kinds. Of the two new tire factories which were recently approved by the government of India, the first to go into production will be the Dunlop factory at Ambattur. It will produce tires for trucks, buses and bicycles and retread rubber, principally for the needs of the South Indian market.

The Second Five Year plan will entail a considerable increase in the volume of truck shipments, amounting to approximately 60 to 70 million tons in 1960-61, as compared to 20-25 million tons at the beginning of the Second Plan. At the same time, it is estimated that bicycles, the most popular means of personal transportation, will increase considerably in number. The production target for bicycles is 12,500,000 in 1960 to 1961 compared with an estimated production of 10,800,000 in 1958. In terms of tire requirements, it is estimated that consumption of automobile tires in 1960 to 1961 will exceed 1.6 million and that of bicycle tires will be in the range of 16 million. Actual production in 1957 was 0.99 million automobile tires and 7.15 million bicycle tires.

• More than 650,000 Volkswagen will be manufactured during 1959, compared with 560,000 which were delivered last year. At the present time, daily production amounts to 2,600 units, of which 500 are trucks. In 1958, 57 per cent of the production was exported. At present, the Volkswagen Werke employs 33,000 people in Wolfsburg, 8,000 in Hannover, 3,000 in Braunschweig and 900 in Kassel.

• Eight hundred tons of North Sumatran rubber have been shipped to Russia from the port of Belawan, the Antara News Agency reports. This is part of a Russian order of 14,000 tons.

• A German expert, Dr. W. Snoep, is investigating the possibility of developing a rubber plantation in Sierra Leone. Dr. Snoep is agricultural adviser to a group of Dutch bankers who are acting on behalf of the African Fruit Co. of Hamburg.

• India and Brazil are the only two rubber manufacturing countries in the world which have their own rubber plantations. With the development of the rubber manufacturing industry in India since the thirties, a change of great importance has come about in the pattern of India's rubber trade with other countries. Before 1936, India was exporting considerable quantities of raw rubber and importing most of the manufactured rubber goods which she needed.

For many years now, the export of raw rubber has not only been stopped but a certain amount has been imported to supplement domestic production. The significance of this change, particularly for South India which grows rubber, can be imagined. The demand for

On the Continent (cont'd)

raw rubber which was roughly 25,000 tons in 1951, is likely to exceed 60,000 tons by 1962.

• The West German rubber industry is doing very well. A few days ago, the Continental Gummiwerke A. G. in Hannover published its stockholders' report. Directors have decided to pay a dividend of 15 per cent for the shares having a value of 110 million marks (approximately $25 million). Last year, the dividend amounted to 12 per cent. The Veritas Gummiwerke A. G., Gelnhausen-Berlin, reports an excellent year also and has decided to pay a dividend of 6 per cent. Sales continued to rise during the past year and in view of the European common market, the outlook for this year is very good.

• Machinery and equipment rental, known and practiced in the United States for a number of years, has been adopted in England. In the May 9 issue of *Rubber Journal and International Plastics,* an item appears which describes a new way of renting machinery and equipment. It states:

"A scheme by which a variety of machines—including those for the manufacture of plastics, etc.—can be hired, without deposit or capital expenditure, has been introduced by F. J. Edwards, Ltd., London. The machine is delivered on the signing of the contract and on receipt of the first monthly hire charge.

"The minimum period of rental is three years with the option of a new agreement for another machine or continuance of the old contract on the same machine at advantageous terms." The fee for the first year amounts to approximately 40 per cent, which can be paid in monthly installments. The usual contract runs for three years.

• The Soviet Russian delegation representing the USSR plastics industry has just finished a two-week visit to England. The delegation studies both the raw materials production and processing machinery utilized in the British industry. Ivan Karataev, vice-president of the Moscow Region Economic Council, headed the delegation.

• The increasing role of plastics and the extent of present interest in corrosion problems was demonstrated at the Corrosion Exhibition which was held in London on April 27 to 30. More than 10,000 people visited the Exhibition, in which plastics were well represented, according to *Rubber Journal and International Plastics.* The Exhibition showed that plastics materials are being used more widely to combat corrosion. Rubber was also represented and there were some interesting exhibits showing what progress is being made in the field of lining intricate structures with rubber.

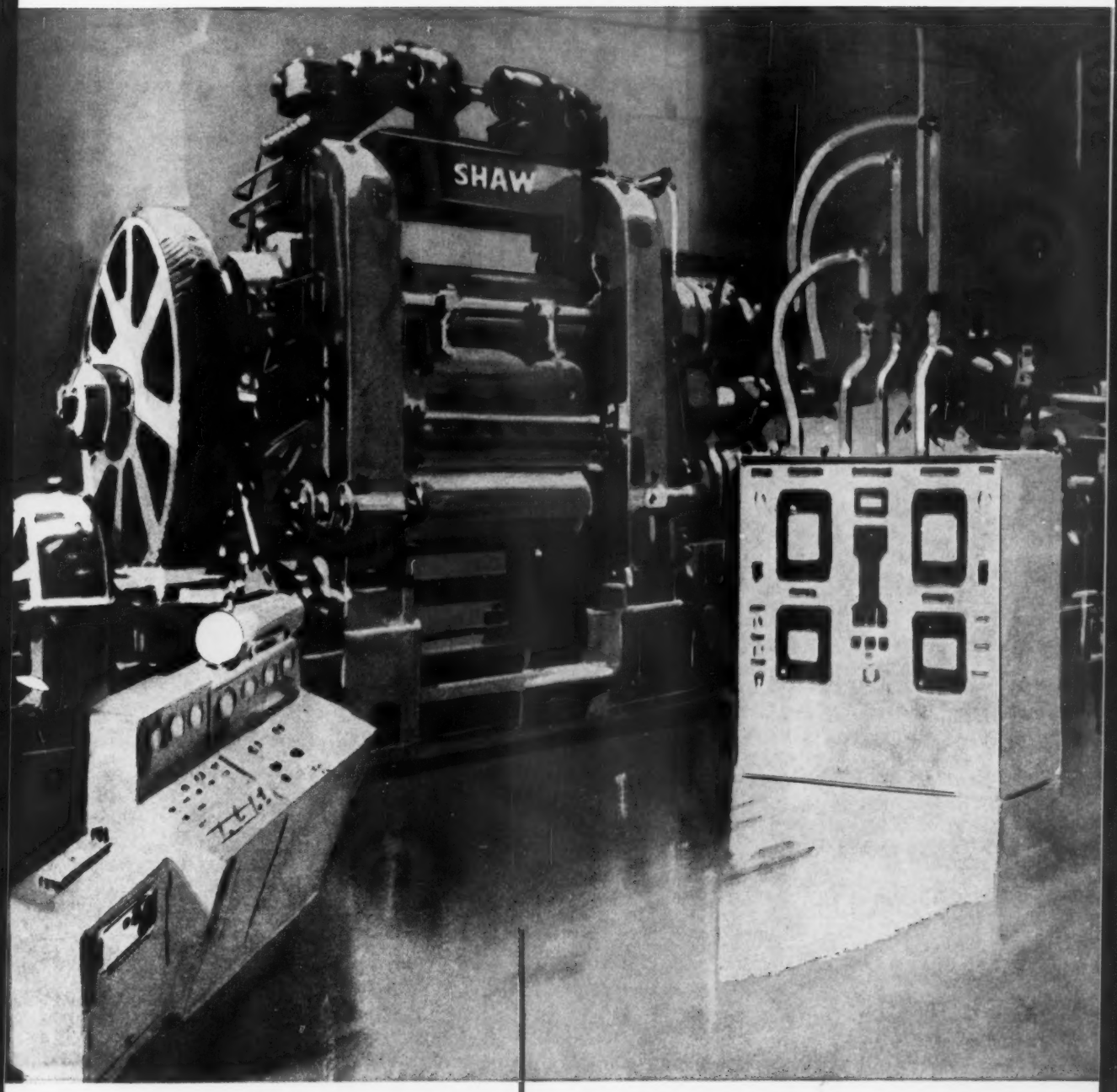
• Alkylphenolaldehyde sulfide resins increase the adhesion of butadiene-styrene rubber according to *Kauchuk i Rezina (Rubber and Resin)* a trade paper published in Moscow. These resins are obtained by treating the condensation product of n-tert.-butylphenol and formaldehyde with SCl_2 or S_2Cl_2 in an alkaline medium. The condensation product is dissolved in dry dichlorethane and a 20 per cent solution is treated at a temperature equaling its boiling point with SCl_2, diluted in an equal amount of dichlorethane.

The boiling mixture is agitated for 90 minutes and the dichlorethane distilled in a vacuum at 60°C. The softening point of the formed resin equals 53-55°C. On further heating to 135°C., the softening point increases from 70 to 120°C. The initial condensation product has an average molecular weight of 260 and the following composition: 75.0 per cent C, 9.2 per cent H, 15.8 per cent O. The molecular weight of the end product equals 589 and has the following composition: 73.0 per cent C, 8.6 per cent H, 12.1 per cent O, 6.3 per cent S.

The disulfide resins B are prepared by treating the condensation product of alkylphenol and formaldehyde with S_2Cl_2 in substantially the same way as alkylphenolaldehyde monosulfide resins. The molecular weight of this resin is 589, which is approximately equal to the calculated value (585). Sulfide resins C are prepared from alkylphenol formaldehyde lacquer resins No. 101 (VTO MKhP 2196-50) which is prepared by condensing n-tert.-butylphenol with formaldehyde in an alkaline medium and subsequently neutralizing it with H_2SO_4 and hardening at 140°C. The physico-mechanical properties of adhesives based on butadiene-styrene rubber SKS-30A containing sulfide resins and vulcanized in the absence of sulfur or accelerators for 60 minutes at 143°C. are listed.

Sulfide resins increase the degree of vulcanization but alkylphenolaldehyde resins decrease the degree of vulcanization of rubbers based on SKS-30A. The sulfide resins impart to the resins high moduli and a high degree of break-strength. Sulfide resins have the same degree of thermal stability and resistance to aging as rubbers not containing these resins or phenolaldehyde resins. Sixty per cent of the total amount of sulfur, introduced into the rubber in the form of a resin is chemically bound to the rubber. Sulfide resins also strengthen the rubber. It could be observed that the sulfide resins increase the dynamic modulus, internal friction and the strength of the rubbers. The effect of sulfide resins on the adhesive properties of adhesives based on SKB-30A is shown and an increase in the content of sulfur and accelerators (up to 5-10 per cent) results in increased efficiency of the rubbers.

The degree of deformation has been found to be in an inverse proportion to the modulus. However, an increase in the content of sulfur and accelerators in the adhesives achieves better coordination of various layers and a very strong layer is formed in the contact region. Sulfide resins are very good adhesives. An increase in the strength of the bond of the vulcanized rubbers is achieved without lowering the adhesive properties. The investigated alkylphenolaldehyde resins inhibit the vulcanization of rubbers and thus decrease the strength of the bonds. Resins which simultaneously decrease the degree of vulcanization of the rubbers as, for instance, resin No. 101, also decrease the strength of the bonds of the rubbers.



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P.2807

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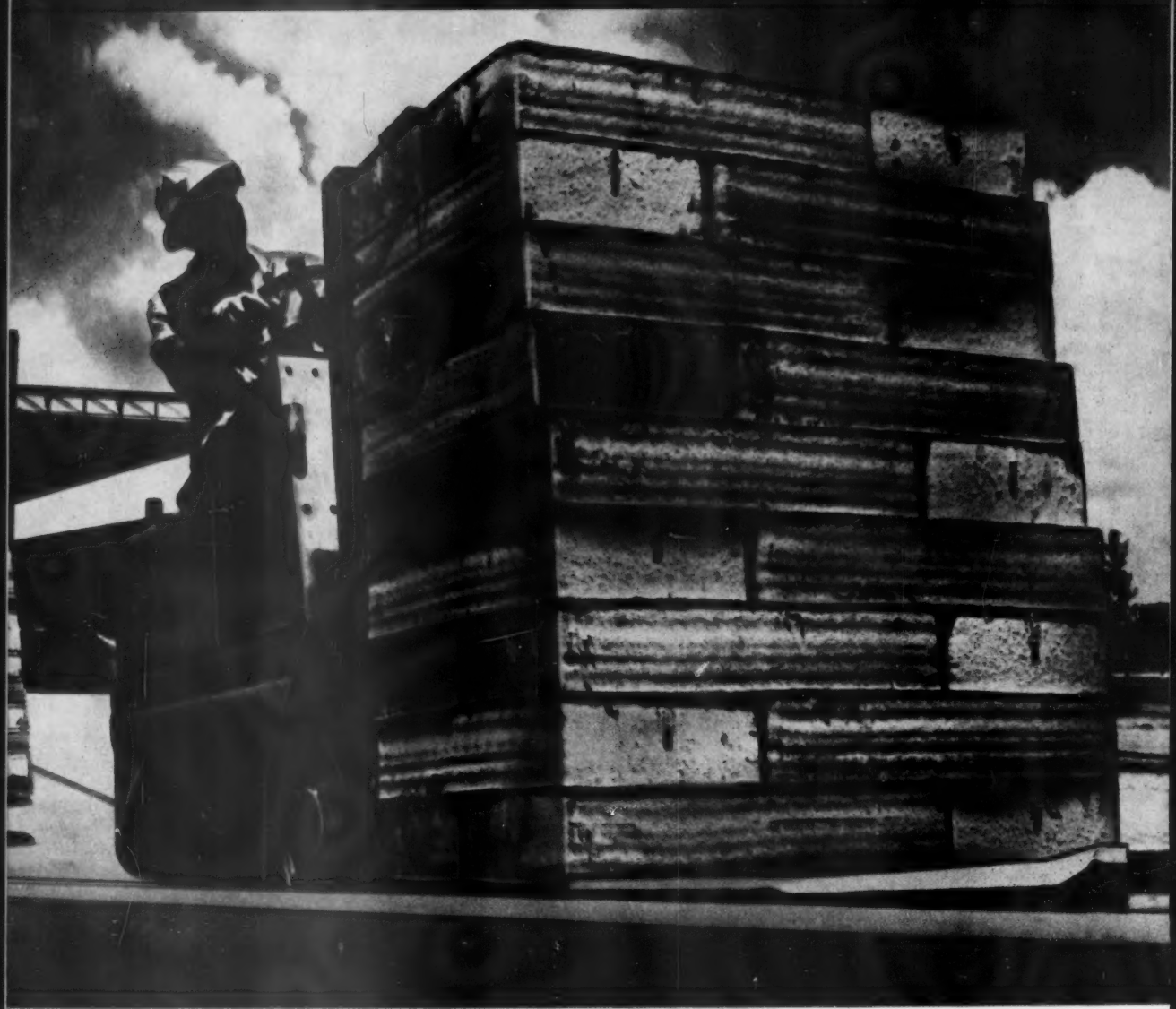

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coming events

June 17-27. International Plastics Exhibition & Convention, Olympia, London, England.

June 19. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 19. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 19. Northern California Rubber Group, Golf Outing, Green Hills Country Club, Millbrae, Calif.

June 21-26. ASTM Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

June 26. Detroit Rubber and Plastics Group, Summer Outing, Western Golf and Country Club, Detroit, Mich.

June 26-28. Los Angeles Rubber Group, Summer Outing, Las Vegas, Nevada.

July 2-18. International Trade Fair and Exposition, Chicago, Ill.

July 6-10. Gordon Research Conferences, "Polymers", Colby Junior College, New London, N. H.

July 6-11. Society of the Chemical Industry, 78th Annual Meeting, Glasgow, Scotland.

July 24. Chicago Rubber Group, Golf Outing, St. Andrews Country Club, Chicago, Ill.

Aug. 4. New York Rubber Group, Golf Outing, Forsgate Country Club, Jamesburg, N. J.

Aug. 16-Sept. 6. International Union of Pure and Applied Chemistry, 17th International Congress and 20th Conference, Munich, Germany.

Aug. 21. Philadelphia Rubber Group, Golf Outing, Manufacturer's Country Club.

Sept. 2-4. 1959 Cryogenic Engineering Conference, University of California, Berkeley, Calif.

Sept. 10-11. ASME Wood Industries Conference, Multnomah Hotel, Portland, Ore.

Sept. 10-11. Society of the Plastics Industry, Midwest Section Conference, French Lick Sheraton Hotel, French Lick, Ind.

Sept. 12. Connecticut Rubber Group, Summer Outing.

Sept. 13-18. American Chemical Society, 136th National Meeting, Atlantic City, N. J.

Sept. 13-17. National Tire Dealers & Retreaders Association, Annual Convention, Washington, D. C.

Sept. 22-Oct. 3. London World Trade Fair, Alexandra Palace, London, England.

Sept. 24. Fort Wayne Rubber & Plastics Group.

Sept. 28-Oct. 2. 14th Annual National Hardware Show, New York Coliseum, New York, N. Y.

Oct. 1-2. Society of the Plastics Industry, 15th New England Section Conference, Wentworth - by - the - Sea, Portsmouth, N. H.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit Leland Hotel, Detroit, Mich.

Oct. 2. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Oct. 6-9. Second International Symposium on "High Temperature Technology", sponsored by Stanford Research Institute, Asilomar, Calif.

Oct. 6. Los Angeles Rubber Group. Meeting sponsored by Plastic and Rubber Products Co., Biltmore Hotel, Los Angeles, Calif.

Oct. 7. Chemical-Finishing Conference sponsored by the National Cotton Council, Mayflower Hotel, Washington, D. C.

Oct. 8. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 12-14. 8th National Clay Conferference, University of Oklahoma, Norman, Okla.

Oct. 13. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 13-14. Society of Plastics Engineers, National Technical Meeting, Ambassador Hotel, Los Angeles, Calif.

Oct. 16. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-25. "Kuneststoffe 1959," International Trade Fair of the Plastics Industry, Duesseldorf, West Germany.

Oct. 19-21. National Paint, Varnish & Lacquer Association, Annual Convention, Chalfonte - Haddon Hall, Atlantic City, N. J.

Oct. 19-23. 47th National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Elastomer & Plastics Group, Northeastern Section, ACS.

Oct. 20-22. 10th National Conference on Standards, Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 21-25. 4th Annual Instrumentation and Automation Show and Conference, Palazzo del l'Arte al Parco, Milan, Italy.

Oct. 23. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Oct. 26-31. International Organization for Standardization, Technical Committee 45, Henry Hudson Hotel, New York, N. Y.

Oct. 26-28. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Nov. 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 5. Rhode Island Rubber Group, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 6. Connecticut Rubber Group, Sports Night.

Nov. 6. Philadelphia Rubber Group, Annual Dance.

Nov. 8-13. Joint International Meeting of Division of Rubber Chemistry, ACS; Committee D-11, ASTM, and Rubber and Plastics Division, ASME, Shoreham Hotel, Washington, D. C.

Nov. 8-10. Toy Production Show, New York Trade Show Building, New York, N. Y.

Nov. 16-20. Automation Show & Conference on Materials Handling, New York Trade Show Building, New York, N. Y.

Nov. 17. Elastomer & Plastics Group, Northeastern Section, ACS.

Nov. 29-Dec. 4. ASME Annual Meeting, Chalfonte-Haddon-Hall, Atlantic City, N. J.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York, N. Y.

Dec. 3. Fort Wayne Rubber & Plastics Group.

Dec. 6-9. American Institute of Chemical Engineers, Annual Meeting, San Francisco, Calif.

Dec. 8. Buffalo Rubber Group, Christmas Party.

Dec. 11. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Christmas Party, Hotel Statler, Detroit, Mich.

Dec. 11. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 12. Southern Ohio Rubber Group, Winter Meeting.

Dec. 18. New York Rubber Group, Christmas Party.

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as if beauty weren't reward enough, it costs less with Ameripol Rubber

The rewards have proved handsome indeed since Rubbermaid Inc., started using new Ameripol 4700 for these automobile floor rugs and other rubber products. Beauty—so important in crystallizing a buyer's thinking—is improved with brighter color, richer feel. The new formula gives rugs superior abrasion resistance and toughness to make them last longer. This added quality is obtained at a substantial cost savings. Rubbermaid's production engineers made over 600 trial batches and determined that Ameripol 4700 will save thousands of dollars annually in raw materials. For economy and quality you'll find Ameripol *the preferred rubber*. And you'll get preferred service from Goodrich-Gulf—technical assistance—convenient packaging—fast shipment from nearby locations. For information, write Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

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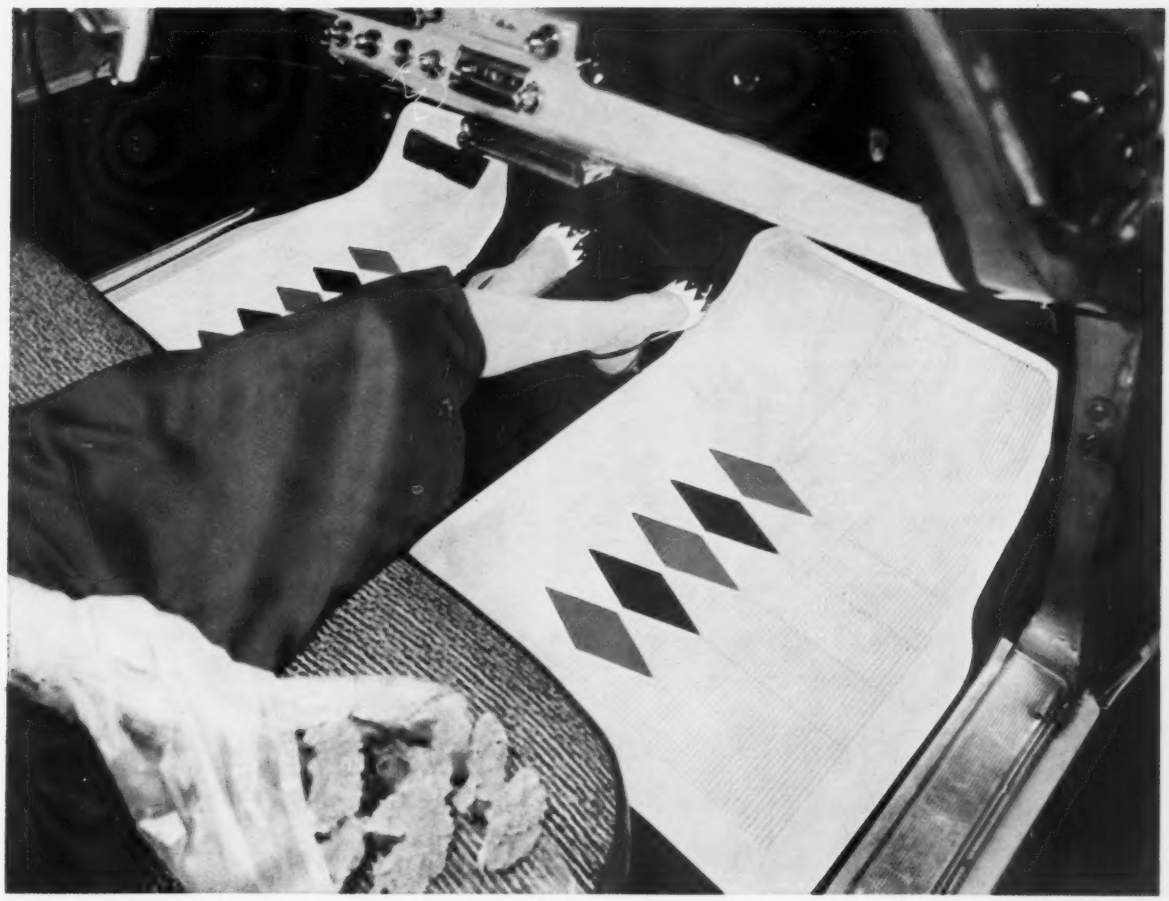

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NEW NRM MODEL 58*

TIRE BUILDING MACHINE

BUILDS ALL PASSENGER TIRE CONSTRUCTIONS

Increases production... profit, with

- ★ **FASTER OPERATION**
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The Model 58 Tire Building Machine is NRM's latest answer to the tire industry's need for faster-working, more *versatile* machines to provide greater production—and therefore greater profit—on building passenger tires of all sizes and constructions.

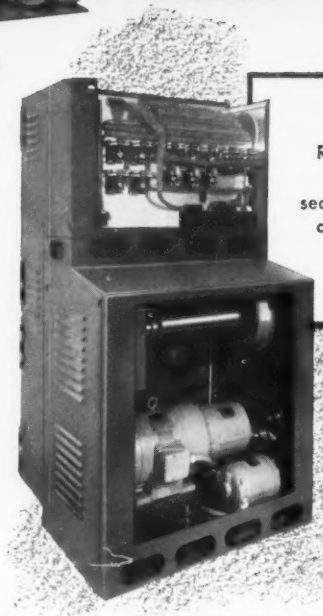
Increasing production capacity of the Model 58 is faster ply-down, bead-set, and turn-up operation, and greater ease of changing from 2-2 to 3-1 or 4-0 and 4-2 construction. Either 2, 3, or 4 plies can be placed on the drum before the turn-down, bead-set and turn-up operations. The constructions are changed by merely turning a selector switch on the panel.

Greater accessibility to sequence timer and motors is provided, as shown in the rear view photo of the machine, by having moved all machine adjustments either to the lower front compartment, or to other convenient locations.

Contributing to the simpler, more efficient tooling and control is a newly designed two-compartment panel having all electrical components in the top of the cabinet, with valves, tread stitcher and bead adjustments, and one-revolution device in the lower compartment.

Tires can be constructed with or without chafers and breakers, and with either flipped or standard beads. Check the table of capacities, and contact us for more information on the NRM Model 58 Passenger Tire Building Machine.

*Also available without sequence timer as Model 60RS.



Rear view showing sequence timer and motors

CAPACITIES

Drum diameters	**13" to 22"**
Drum shoulder sets	**11½" to 28"**
Bead diameters from	**12" to 20"**
Maximum ply width	**35½"**
Green tire clearance	**26"**

2076-A

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As Soule Sees It...

by Kenneth J. Soule

Inching Along

Directors of the standards laboratories of the United States, Canada, the United Kingdom, Australia, South Africa and New Zealand have come to an international agreement on a new metric value for the inch.

Effective July 1, 1959, the inch for calibrating line standards and end gages will be exactly equal to 25.4 millimeters. This compares with the present U.S. value of 25.400508 millimeters to the inch and the U.K. inch of 25.399956 millimeters. As a result, the new inch to be used in this country will be two millionths of an inch shorter than the one in present use.

These changes will probably be of vital interest only to engineers involved with close dimensional standards such as gage blocks, master ring gages, etc. However, we did think you might like to know about these signs of international cooperation, and we also dare to hope that all "inch worms" may get frustrated at being rudely foreshortened, and worry themselves to death.

Tires — Past, Present and Future

Since their initial use on motor driven vehicles in the year 1895, automobile tires have chiefly been made in three basic designs. The first was the "single-tube" pneumatic. This was really only an oversized bicycle tire consisting of an endless tube of rubber-coated fabric with a more or less air-tight rubber lining and an outer rubber covering to protect against wear and weather. Although this type of tire remained in use for only a period of about five years, it served a very important purpose, viz., to demonstrate that the automobile was a practical invention—when it was equipped with air-filled tires.

The "single-tube" tire was supplanted by a pneumatic tire with a separate and distinct inner tube in about 1900. This general type of tire, with numerous refinements and improvements in basic materials of construction and in the building methods employed, stayed in vogue for almost fifty years.

In 1947, the "tubeless" tire was developed and soon came into widespread (although not universal) use. It is hardly necessary to say that this construction has a thin inner layer of butyl rubber to prevent diffusion of air into the casing and a layer of puncture sealing materials in the crown area.

These tires have one thing in common. They are inflated with air and remain useful only as long as the proper amount of air remains in the tires. Their weakness, in all cases, has been their vulnerability to punctures and/or blowouts.

The latest tire to hit the news, if not the market, is Dayton Rubber's foam-filled entry. The foaming material is "Polyrubber", which is the name given by the Dayton Rubber subsidiary, American Latex, to its polyester-based flexible urethane foam. The foam is injected into the tire in liquid form through a hole bored into the inner portion of the tire rim. As it foams to completely fill the space inside the tire, it is said to bond firmly to both the metal rim and the tire casing. Although the foaming compound can be varied to give an almost infinite variety of foam character and body, the one selected as most suitable has a foam density of about 33 pounds per cubic foot.

Dayton has made countless laboratory and road tests on its new tire and it claims that in all essential respects the tire duplicates the performance and the riding qualities of conventional tires. In addition, the urethane foam tires seem to exhibit more stability and less distortion during cornering than regular tires, and also to give better shock absorption without the usual accompanying rebound.

Of course, the big plus is the built-in and everlasting immunity to punctures, flats, and blowouts. To dramatize this feature, Dayton devised a series of torture tests on its tire. These included the drilling of a one inch hole through the sidewall, the use of the tire as a target for police rifle fire, and the removal of a 3-inch wedge from the tread with a power saw. In spite of all this maltreatment the tire functioned properly in subsequent driving tests.

Obviously, a great many hours and miles of road tests will have to be logged before a tire as radical as this can secure unqualified approval. Since there is no apparent way in which the built-in air in the foam tire can be replaced or replenished in case the riding qualities change after long and continued service, the testing will have to be especially long and conclusive. Moreover, since the amount of foam required to fill an average passenger tire is about 33 pounds (at a price of approximately $1.00 per pound) it would seem that on the cost angle alone there will be considerable delay before this unconventional tire becomes commonplace. But, even now, the vision of a guarantee of no flats, or blowouts is very alluring and intriguing to any motorist.

Synthetic Names for Synthetic Fibers

The Federal Trade Commission has on its present docket a complicated piece of writing which is known official publication, *Federal Register* (Feb. 10, 1959), Act." Some of the unofficial names applied to it are much shorter and considerably more pungent.

The Act, as reported in detail in the government's official publication, *Federal Register* (Feb. 10, 1959) covers some six and one half pages of fine print—three columns to page—which would be the equivalent of about 10 full pages in RUBBER AGE. Wading through this mass of verbiage, it appears that the proposed law covers three major points: (1) The setting up of generic names and definitions for manufactured fibers. (2) Rules for the use of fiber trademarks on labels. (3) Rules covering the use of trademarks in advertising.

Let's take them up in order. First, *Generic Names and Definitions*. Of these, 16 names and their accom-

As Soule Sees It (Cont'd)

panying definitions are listed, and are thus "hereby established." These are "Acrylic", "Modacrylic", "Polyester", "Saran", "Azlon", "Nytril", "Nylon", "Rayon", "Acetate", "Rubber", "Metallic", "Alvyne", "Olenn", "Glass", "Vinyon", and "Spandex." For illustrative purposes, we cite one definition—"Polyester—A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 85 per cent of a dihydric alcohol and terephthalic acid."

All of the generic names and definitions listed may be scientifically accurate and correct, but I submit that such a legal listing by Congress and the attempt to have the F.T.C., or any other federal agency, police its context and its use is ill-advised and unnecessary. This type of work, if it needs to be done at all, belongs with the textile groups themselves, and not with the government. As far as I can observe no consumer or consumer group will be any wiser, any less confused concerning fibers, or any better protected from unprincipled manufacturers (if any).

The general public has absolutely no interest in the chemical composition of the synthetic fibers that are used. In fact, not one consumer in ninety million cares in the slightest measure whether Dacron for instance, is a polyester, a polyether, or even if it is remotely related to the polyanthus (primrose) family! If it, or any other synthetic fiber has personally been tried, and found satisfactory by Mr. or Mrs. Consumer that is all that matters to them. Under these circumstances, a fancy list of fancy names and definitions becomes as useless to the general public as a 54 page treatise on "How To Grow A Flowing Beard", would be to Fidel Castro.

The second major point in the Act covers the use of fiber trademarks on any and all labels, and it clearly states that the trademark name *may not be used alone or may not be set in larger type than the generic name* which must accompany it. Whether this type of harassment is intentional or accidental, it is harassment none the less. A trademark costs a good deal of money, time, and effort before it can be obtained and become valuable to the holder by reason of having been made well known to the consuming public.

The government, having allowed a business company to purchase and use a trademark, is putting impossible restrictions in the way of its being called to the attention of potential customers. If this is not downright dishonest, it is surely a classic example of taking money (for a trademark) under false pretenses. You might as well sell a man a fishing license, say for trout, and then require the user to carry a cowbell with him whenever he went fishing and to ring said bell at least once every 1½ minutes!

The third major point in the Act states that "where a fiber trademark is used in advertising, the trademark and the generic name of the fiber must appear in the required information in immediate proximity and conjunction with each other, *in type or lettering of equal size and conspicuousness.*"

The same general remarks apply to this section as to the one concerning labels. There seems to be no earthly reason to justify this peculiar attempt to regulate the legitimate use of trademark names. We suggest that it is discriminatory, or perhaps even illegal to specify in what size type trademark names may be used on labels or in all advertising.

Imagine if you will, the hordes of label-snoopers who will be required to police the labeled garments in the stores, warehouses, and perhaps, even in your homes—to say nothing of the legions of government paid newspaper and magazine readers feverishly seeking advertisements which contravene the sacred dictums of the Textile Fiber Products Identification Act regarding type size used. If this ever takes place, the hectic enforcement days of the "Volstead Act" will become a delightful memory by comparison!

Up in the Air — Pronto

According to a news release and photo which appeared in the daily papers recently, Goodyear Aircraft Corp. has developed and produced a 295-pound "all-rubber airplane." The machine was given its initial public demonstration at the first World Congress of Flight in Las Vegas, Nev., which began April 12, 1959.

It is claimed that the plane can be unpacked, inflated with air and be ready for flight in six minutes. The Army is said to be interested in the gadget (called the Inflatoplane) for observation and rescue work. The craft is 19 feet long with a wing spread of 28 feet and has a cruising speed of fifty-five miles per hour. It is powered by a sixty horse-power engine.

No details were given as to the type or quantity of struts or other reinforcing members used, nor was mention made of the kind of landing gear (if any). However, since the machine has the general appearance of a conventional small plane, such as a Piper Cub, it surely requires built-in strength members, and the weight figure given must be only for the rubber and rubberized fabric components. Therefore, it seems quite unlikely (pending still further simplification) that city commuters can leave their offices at 5 p.m., unroll their personal planes in some nearby vacant lot, and land in the suburban potato patch near home at 5:17½ p.m. A nice dream, but it won't work for a few months yet, anyhow. Maybe it's better that way since the railroads and buses are having a tough enough time making a living as it is—to say nothing of the probability of aerial traffic jams.

Fore!

It is reported that a new golf ball has been developed in which the usual liquid or cork center is being replaced by a sphere of nylon. The claim is made that drives which are 20 to 30 yards longer than with a conventional golf ball can be regularly realized with the nylon-centered ball.

This is quite interesting, if true, but while distance off the tee is moderately important, many of us will settle for a somewhat shorter drive, as long as it will stay in the fairway. Therefore my efforts will continue to perfect a golf ball with a built-in straightener-outer, one which inherently will avoid all deep rough and possess a positive horror of winding up in water holes. As soon as this minor development is completed, an announcement will be forthcoming.

MONSANTO RUBBER CHEMICALS ANSWER ANOTHER IMPORTANT COMPOUNDING

QUESTION:

What new sulfenamide accelerator gives me long delayed-action for greatest safety from scorch without sacrifice of speed at curing temperatures?

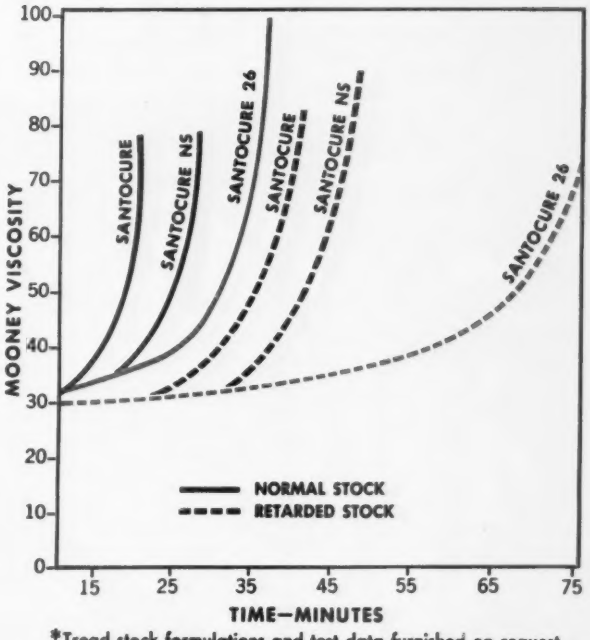
ANSWER:

New SANTOCURE 26

See how Monsanto's new SANTOCURE 26 compares with regular SANTOCURE and SANTOCURE NS—gives long delayed-action for greatest safety from scorch in a fast-curing natural rubber tread stock.* Now, with SANTOCURE 26, *you* can formulate around more extreme heat history without sacrifice of "mold-time" in *your* natural and synthetic rubber compounds.

Monsanto's family of sulfenamide accelerators give you the broadest range of controlled, delayed-action cures you can get. And SANTOCURE 26 protects *best* against premature curing of stocks from longer bin storage, higher processing temperatures, thicker sections, greater activation, prolonged time on the mill or calender and in the Banbury or extruder.

Storage and in-plant processing tests show that SANTOCURE 26 is the most stable sulfenamide accelerator you can use—gives day-to-day and season-to-season uniformity of cure. It responds to secondary accelerators and other compounding ingredients much the same as do other members of the SANTOCURE family. Try SANTOCURE 26 and see what it can do for scorchy stocks.



*Tread stock formulations and test data furnished on request.

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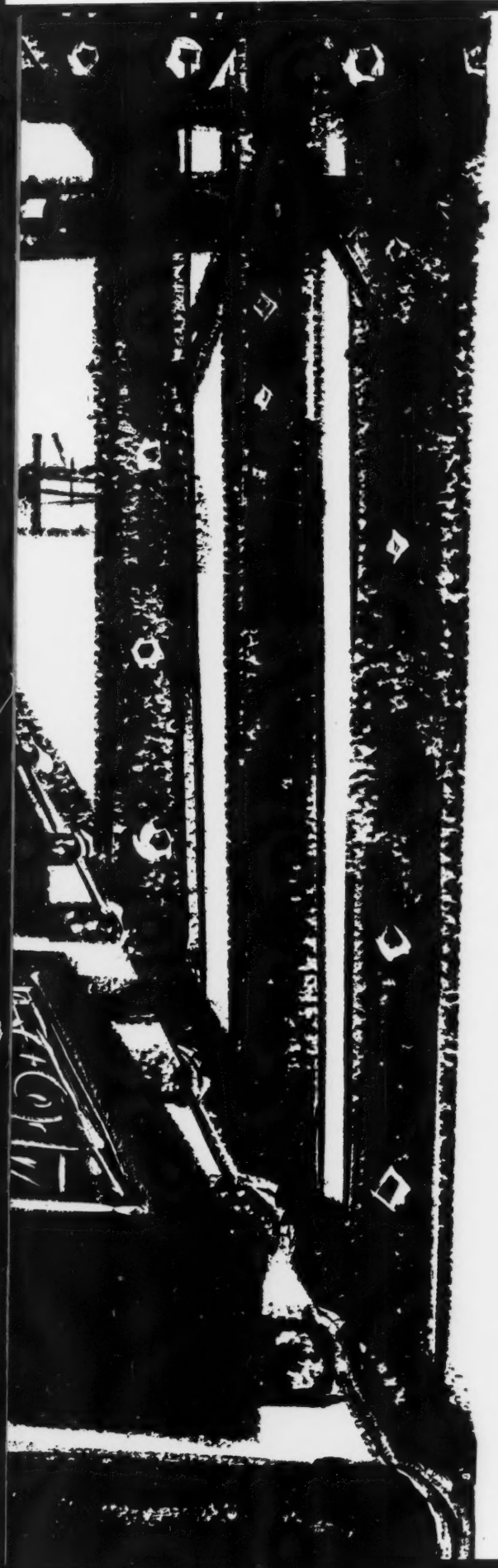

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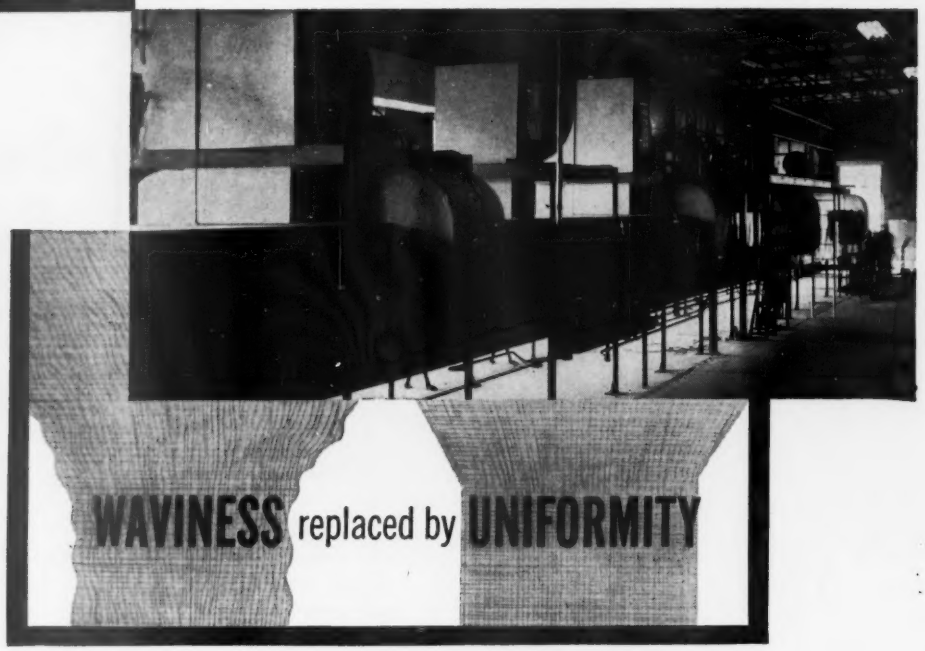

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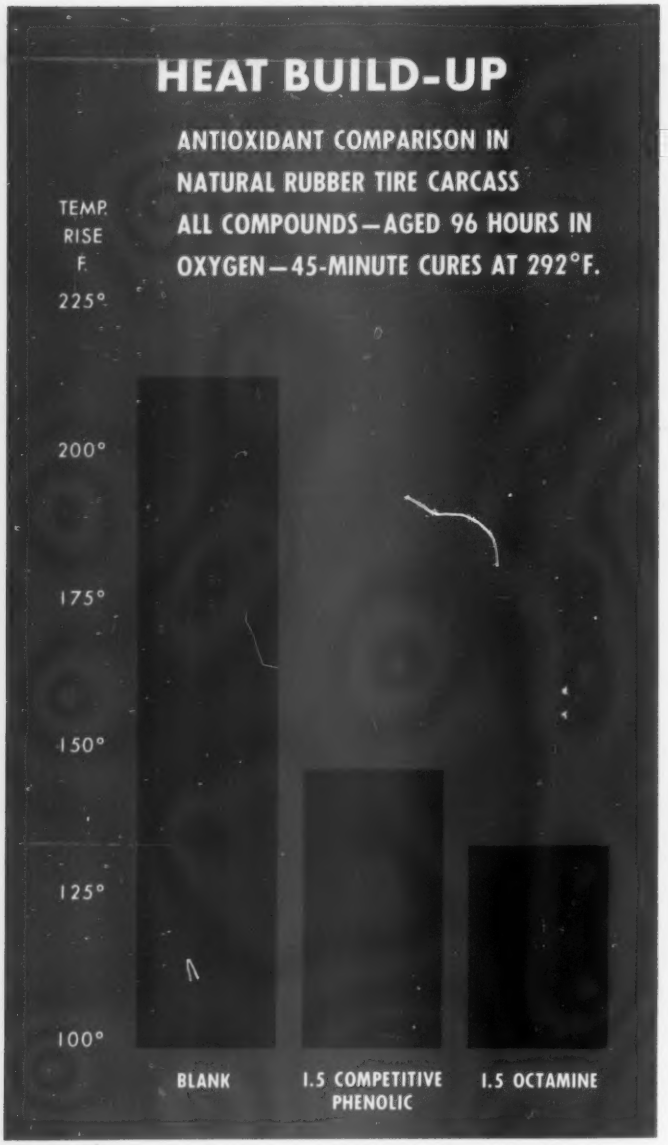

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Properties and Performance of RUBBER FILLERS

Effects of particle size and shape, surface area, degree of agglomeration and wetting

By ELI M. DANNENBERG
Director of Carbon Black Research, Godfrey L. Cabot, Inc., Cambridge, Massachusetts

ONE OF the lesser known milestones in the progress of the rubber industry was the invention of the rubber masticator in 1820 by Thomas Hancock. Hancock's masticator consisted of a metal drum with attached spikes which revolved in an enclosed chamber. When rubber was processed by this machine it became soft and receptive to all kinds of powders, oils, waxes, pitches, glue and other materials. Prior to this invention compounding ingredients were laboriously added to rubber in solvent solution by stirring, followed by solvent evaporation. One of the troubles with the masticator was that it aggravated the already serious deficiency of unvulcanized rubber of being tacky and sticky. To avoid this problem, Hancock added large quantities of talc to "dry up" the rubber. This addition of a filler, described in Hancock's patent of 1843, is apparently one of the first examples of the use of an ingredient, other than sulfur, for product quality improvement, in contrast to the previous arts of pigment coloring and cheapening by filler dilution.

The discovery of vulcanization had a large influence on the use of fillers and other compounding ingredients by making rubber a much more useful material. Products covering a broad range of hardness and elasticity were required for all kinds of applications, and these were made by modifying the rubber with oils and fillers. Early rubber poineers did such a thorough job of mixing into rubber everything they could lay their hands on, or had no use for, that almost all of the commonly used filler materials of today have been in use throughout the history of the industry. These include chalks, clays, barytes, talc, whiting, zinc oxide, silica and carbon black.

Before the turn of the century it was thought that quality rubber products should be composed of rubber, and nothing else. Even as recently as 1922, Henry C. Pearson, in his classic book titled "Pneumatic Tires", had to include a few remarks on what he called The "Pure Gum" Fallacy. The following quotation *(1)* is of interest: "There is often an expressed wish on the part of tire purchasers that they be assured that they are getting only 'pure gum'; that is pure rubber with the simple addition of 6 to 10 percent of sulfur. This assurance is often given, but as a matter of fact they neither need nor should they receive pure gum. . . . It is safe to say today that few manufacturers adulterate tires for the mere sake of cheapening."

The public was apparently at least twenty years behind the rubber technologists, for it was in 1891 that Heinzerling and Pahl *(2)* showed that the addition of zinc oxide and magnesia increased the strength of rubber. In 1905 Ditmar *(3)* was the first to realize the true importance of zinc oxide as a reinforcing or active filler for rubber; that is, a material which improved strength and wearing properties. For many years, until the value of carbon black was realized, zinc oxide remained the most important reinforcing filler in use. The fact that carbon black improved the strength of rubber beyond anything previously known was also discovered as early as 1904 by S. C. Mote *(4)* at the India Rubber Gutta Percha and Telegraph Works in Silvertown, England. However, it was not until 1910 that carbon black began to be used in tire treads.

The reason for this delay was that previous to about 1910 tire failures were as much due to the weakness of the tire body as to the tread. The use of cord construction instead of canvas-ply improved the tire carcass to such a degree that it became possible to wear out the tread, and the need for better treads thus became urgent. The replacement of zinc oxide by carbon black in tire treads was a slow process. As late as 1925 published tire tread recipes included mixtures of zinc oxide and carbon black as the reinforcing ingredients. Perhaps one of the reasons for this slow progress was that the only available means of assess-

Note: This article is based on a paper delivered as part of a course entitled "Introductory Rubber Compounding Lectures," sponsored by the Akron Rubber Group, at the University of Akron on November 3, 1958.

TABLE I—PROPERTIES OF VARIOUS FILLERS

23 Parts Filler/100 Parts Natural Rubber

Filler	Arithmetic Mean Diameter mμ	Tensile Strength	Hardness	% Resilience
Whiting	550	2,870	51	74
Barytes	500	2,840	51	74
Magnesium Carbonate	410	3,130	57	70
Thermax	274(472)*	3,500	50	74
Lithopone	230	3,550	53	73
Dixie Clay	200	3,410	54	68
Zinc Oxide (Ordinary)	130	3,620	55	70
Zinc Oxide (Fine Particle)	90	4,000	57	71
FT Black	74(180)	4,130	50	69
Frantex B	65	4,400	63	71
HMF Black	51(60)	3,900	61	69
Silene EF	43	3,620	56	—
HAF Black	34(24)	4,700	62	63
EPC Black	31(29)	4,300	59	—
MPC Black	28(25)	4,900	68	42
Hi-Sil	25	3,800	60	—
Aerosil	14	—	—	—

*Values in parentheses were determined on different samples in the Godfrey L. Cabot Laboratories, Cambridge, Massachusetts.

ing the improvement in road wear was by long, repeated, and expensive road testing of finished tires. This is as true today as it was in the early days of the rubber industry.

The rapid advances in rubber compounding and tire construction which occurred after the First World War were reflected in about a 50% increase in mileage guarantees in 1919 from 3500 to 7500 miles to 6000 to 8000 miles *(5)*. Fortunately, progress has continued to present-day levels of over 25,000 miles.

Reinforced Systems

Fillers are mixed with rubber for two reasons. Originally the purpose was simply to extend and cheapen the rubber compound. Fillers used in this manner have been called "inert", "inactive", and "non-reinforcing." Fillers which add some desirable qualities to the final compound, and increase the serviceability of the end product, have been called "active", "semi-reinforcing", or "reinforcing." The classification of fillers into these two groups is quite arbitrary, as extending and reinforcing properties are not mutually exclusive properties. There are numerous examples of fillers which can be used in relatively large amounts to extend rubber, and which also contribute substantially to strength and serviceability. As a matter of fact, the ideal filler would be one which costs practically nothing; which could be used in large quantities; and which would give extremely strong, reinforced, and still highly elastic vulcanizates. That this ideal is a long way from realization is shown by the very large number of fillers presently used for rubber compounding.

The term "reinforcement" is used in many different ways in various industries, and has several different meanings in the rubber industry. There are many different reinforced structures and materials. Examples of these are:

(1) The pneumatic tire is a structure *mechanically reinforced* by textile cords and steel.

(2) Various organic plastics require cellulosic or glass fiber *reinforcement* in order to achieve structural rigidity and strength.

(3) Molding compounds of the thermosetting variety *are reinforced* with finely ground fibrous materials such as wood flour or cotton floc for strength.

(4) Concrete and asphalt for buildings and roads are *reinforced* by the addition of gravel and sand.

(5) Paint films used in outdoor service are extended and *reinforced* with pigments to obtain good weathering properties.

(6) Even glass can be strengthened *and reinforced* by controlling the size and amount of crystalline material present in the amorphous matrix, as shown recently by the Corning Glass development of "Pyrocyram", a new high impact resistant glass.

(7) In the field of metallurgy, the tensile strength and yield point of high carbon steel can be shown to be *reinforced* by the presence of submicroscopic particles of carbon.

It is remarkable to note that there are very few commercially useful materials which are simple, single phase, homogeneous materials. It is for this reason that there is such a large variety of modifying ingredients, including fillers, plasticizers, antioxidants, antiozonants, and other materials.

In the field of rubber technology there are various uses of the term "reinforcement." Coumarone indene resins, which contribute to the tensile strength of highly loaded light-colored vulcanizates, are classified as "reinforcing." High styrene resins are also "reinforcing" because of their contribution to the stiffness and wearing properties of rubber shoe soles. Lignin and certain synthetic resins produced in highly subdivided forms are also reinforcing when judged by such properties as tensile and tear. Carbon and noncarbon particulate fillers are used for a variety of reinforcing effects.

The best known and most important example of filler reinforcement is the tire tread where resistance to abrasive wear and cracking is achieved by the use of finely divided carbon blacks. Electrical cable jackets are reinforced with carbon black to resist a different type of abrasion and cutting. Silicone rubber is reinforced with silica pigments to resist tearing. Many other examples of the filler reinforcement of rubbers could be cited where the requirements in performance are not simply matters of tensile strength, modulus, tear, abrasion, etc., but usually complex combinations of various properties.

The common characteristics of all these elastomer "reinforced" systems are (1) the presence of two phases in which the dispersed phase is relatively rigid with respect to the elastic matrix; (2) a high interfacial surface area at the phase boundaries, i.e., small particle size for the dispersed phase; (3) a high degree of adhesion or bonding between the two phases; and (4) the elastic matrix must be "tied together", "crosslinked", "cured", or "vulcanized" to restrict plastic

flow. In general, the dispersed phase will not be characterized by single particles surrounded completely by rubber, but will be in a more or less flocculated condition. High elasticity is associated with good dispersion and a minimum of flocculation.

The properties which are known to be of primary importance in determining extending or reinforcing behavior are (1) particle size or surface area, (2) particle shape, (3) degree and strength of particle aggregation, and (4) surface properties.

Particle Size and Surface Area

Rubber fillers cover a tremendous range in particle size. Only the least reinforcing and coarsest materials have particles large enough to be resolved by the ordinary light microscope. In most cases it requires the great resolving power of the electron microscope to distinguish individual particles. The coarser clays and ground whitings can have particle sizes as large as 10 microns (10^{-3} cm) compared with the finest reinforcing fillers which can be as low as 10 millimicrons (10^{-6} cm). This is a thousand-fold difference in particle diameters. Since fillers are used in rubber on a volume basis, it is of importance to note that, per unit volume, the 10-millimicron filler would have $(10^3)^3$ — 1,000,000,000 — one billion times more particles than the same volume of 10-micron filler. It is therefore not particularly surprising to find that fillers of different particle sizes have different effects on rubber properties. As a matter of fact, it is pretty safe to say that a significant change in the particle size of a given filler will change practically every mechanical property of the loaded vulcanizate that can be measured.

The effect of particle size on rubber properties is illustrated in Table I, taken from Flemmert's book on reinforcing fillers.

Although this particular set of data shows that rubber properties are not exactly in line with particle size, the general trends are quite clear. The following points should be noted:

(1) White or mineral pigments cover a broader particle size range than the carbon blacks.

(2) The smaller the particle size, the higher is the tensile strength. Since natural rubber gum (i.e., without any filler) has a high tensile strength, it might be said that the finer particle size fillers cause a smaller decrease in tensile strength. In the case of butadiene-styrene copolymer rubber, which has little strength in the gum state, the addition of reinforcing fillers causes marked increases in tensile strength. This point will be discussed more fully later.

(3) Hardness increases as particle size decreases. Larger numbers of particles in the case of the fine fillers immobilize more rubber, increasing hardness.

(4) "Rubberiness" or resilience decreases as particle size decreases. The presence of filler places restrictions on the mobility of the elastic rubber network.

Particle size is the most important characteristic property of a rubber filler. Among the fillers used in rubber, the carbon blacks as a group are made in a wide range of well-defined particle sizes, and are therefore convenient to illustrate particle size effects. Unfortunately, even with the carbon blacks, other factors, such as "structure" and effect on rate of cure, tend to obscure or confound simple particle size effects. Nevertheless, the carbon blacks are useful for showing particle size effects on rubber properties.

The particle size of a filler is usually loosely referred to simply as "particle size." What is meant is a *particle diameter,* and most always, the *arithmetic mean diameter,* or the *number average diameter.* This diameter is expressed mathematically as

$$\Sigma\ nd/N = d_n.$$

Illustrating this formula with a simple example: taking five balls 1-inch in diameter, and one ball 7-inches in diameter, the number average diameter of all the balls is

$$d_n = \frac{(5 \times 1) + (1 \times 7)}{6} = 2 \text{ inches.}$$

This answer of 2 inches is rather meaningless since it does not have any real fundamental significance. Another diameter which is far more useful is called the *surface mean diameter* or the *mean volume surface diameter.* This diameter bears an inverse relationship to specific surface area in square meters per gram. Specific surface can be expressed as

$$S = \frac{\text{Sum of the areas}}{\text{Total weight}} =$$

$$\frac{\Sigma n\pi d^2}{\rho\Sigma\frac{n\pi d^3}{6}} = \frac{6}{\rho\frac{\Sigma nd^3}{\Sigma nd^2}} = \frac{6}{\rho d_A}$$

No other diameter except d_A can be used in this expression to calculate surface area from actual electron microscope particle size counts.

Going back to the previous example,

$$d_A = \frac{\Sigma nd^3}{\Sigma nd^2} = \frac{5 \times 1^3 + 1 \times 7^3}{5 \times 1^2 + 1 \times 7^2} = \frac{348}{54} = 6.45.$$

It is obvious that the surface mean area diameter gives larger values than the arithmetic or number average diameter; i.e., it places more weight on the larger particles. But, after all, in this obviously extreme example, 98% of the actual weight of the system is in the 7-inch diameter "particle."

Other average diameters can also be defined. The diameter necessary for the same total number of equal-sized particles to have the same surface area is the mean surface diameter,

$$d_s = \sqrt{\frac{\Sigma nd^2}{N}} = \sqrt{\frac{5 \times 1^2 + 1 \times 7^2}{6}} = \sqrt{9} = 3.0.$$

The diameter necessary for the same total number of

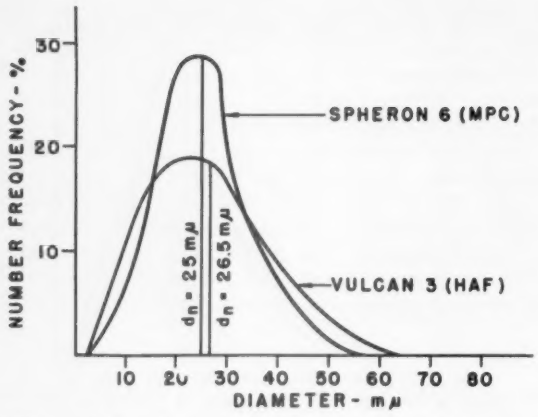

FIG. 1—Number frequency distribution for typical MPC and HAF blacks.

equal-sized particles to have the same volume or weight is the mean weight diameter,

$$d_W = \sqrt[3]{\frac{\Sigma n d^3}{N}} = \sqrt[3]{\frac{5 \times 1^3 + 1 \times 7^3}{6}} = \sqrt[3]{\frac{348}{6}} = \sqrt[3]{58} = 3.9.$$

It can be seen that

$$d_n < d_a < d_W < d_A.$$

The simple arithmetic mean diameter gives the smallest absolute number.

The purpose in describing some of the possible average diameters is to emphasize the difficulty, and often the utter futility, of trying to express a particle size distribution with a single number. The problem of giving a number to a particle size distribution is even more complicated when one is not dealing with spheres, but with irregular shapes, such as platelets and needles. In these cases, one resorts to *equivalent spherical diameters;* that is, a sphere of such diameter that it would enclose the same volume, or a sphere which has the same surface area as the actual non-spherical particle. In the case of thin platelets and needles this type of diameter can be quite meaningless.

Figure 1 shows number frequency distribution curves for a typical medium processing channel (MPC) black and a high abrasion oil furnace (HAF) black. The curves are not symmetrical but are skewed to the right, a characteristic feature of all carbon blacks. The MPC black curve is narrower and more sharply defined than the HAF black curve showing its greater uniformity in particle size. A completely "monodispersed" material, consisting of particles all of the same size, would be represented by a line extending from the diameter ordinate to a number frequency of 100 per cent. The arithmetic mean diameters d_n, are shown in Figure 1, and it will be noted that they do not correspond to the actual maxima in the distribution curves. The maxima points are the most frequent diameters or the "modal" diameters.

Figure 2 shows electron micrographs of medium thermal (MT) and super abrasion furnace (SAF) blacks. These two grades have been selected to illustrate the present-day extreme variations in particle size of carbon blacks used by the rubber industry.

The total surface area of a powder is related to the particle size. In the case of symmetrical solid shapes, such as spheres and cubes, one can easily calculate the surface area, and there is only one single value for uniformly sized particles of given volume. For anisometric particles, the surface area can increase at constant volume as the particle shape diverges from that of a sphere. Thus, a thin plate of a given volume will have a greater surface area than the equivalent sphere. Particles can also be porous, like a sponge, and in these cases the total surface area is the sum of the external, geometric particle surface and the internal surface.

The total surface area is measured by gaseous adsorption techniques at low temperatures. Nitrogen is generally used as the absorbing gas. The covering area, or "squatting area," of a nitrogen molecule is reasonably well known, so that by picking conditions where there is essentially a monomolecular layer of nitrogen molecules sitting on the surface, and knowing the total number of molecules adsorbed per gram of sample, the surface area can be calculated. It is conveniently expressed in units of square meters per gram.

The external surface area or specific surface is estimated from electron microscope pictures by counting particles of varying diameters. The formula for calculating specific surface area from electron micrographs is

$$S = 6/\rho d_A,$$

which was previously mentioned in connection with the use of the surface mean diameter, d_A.

The difference between the total nitrogen area and the electron microscope measured external area is the internal surface area, or "porous" area. The ratio of the total surface to the external surface areas has been called the porosity factor.

It has been found that the rubber grade furnace blacks and the coarser channel blacks are essentially non-porous, since good agreement is obtained between electron microscope and nitrogen surface areas. The finer channel blacks used by the paint and ink indus-

TABLE II—EFFECT OF CARBON BLACK ON PROPERTIES OF BUTADIENE-STYRENE RUBBER TREAD FORMULATION

Type of Black	d_n (millimicrons)	d_A	Tensile	Relative Laboratory Abrasion	Relative Road Wear
SAF	20	25	3,600	1.35	1.25
ISAF	24	33	3,300	1.25	1.15
HAF	28	36	3,200	1.00	1.00
EPC	30	35	3,100	0.80	0.90
FEF	39	55	2,600	0.64	0.72
HMF	49	73	2,300	0.56	0.66
SRF	70	96	2,100	0.48	0.60
FT	180	198	1,800	0.22	—
MT	472	566	1,400	0.18	—

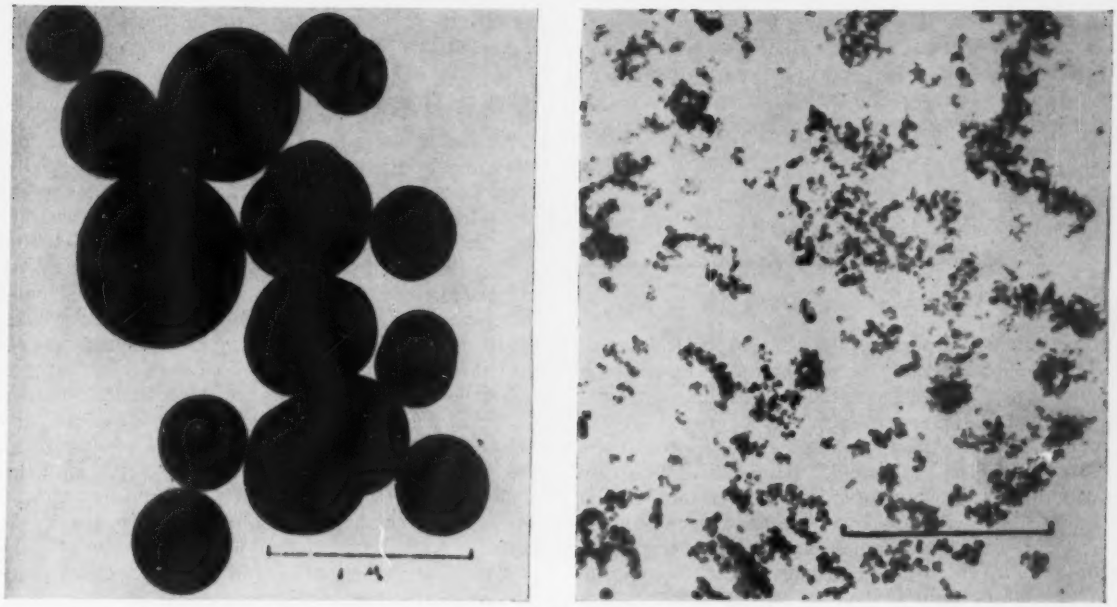

FIG. 2—Electron micrographs of a medium thermal black (left) and a super abrasion furnace black (right).

tries are progressively more porous as their particle sizes decrease.

As was previously mentioned, the particle size of a rubber filler influences practically every measurable property of the rubber compound. The processability of unvulcanized compounds becomes more and more difficult with decreasing particle size. Finely divided materials require longer incorporation times and more energetic mixing conditions to achieve adequate dispersion. As particle size decreases the Mooney viscosities increase, resulting in greater power consumption, higher mixing temperatures, and increased scorching tendencies.

In vulcanized compounds small particle size reduces elasticity and resilience and increases hardness. These negative attributes are, of course, usually tolerated because of the positive contribution of small particle size to strength or reinforcement. Table II lists a particle size range of rubber-grade carbon blacks and their associated properties in a standard butadiene-styrene rubber tread formulation. Both the arithmetic mean diameter and the larger surface mean diameter are shown. The rubber data consist of three properties—tensile strength, laboratory abrasion, and road wear—all of which are useful and reliable criteria of reinforcement.

Since pure "gum" styrene rubber vulcanizates have little mechanical strength without the addition of fillers, this synthetic rubber responds very markedly to filler reinforcement. Even the coarsest carbon black grade listed, MT, improves the tensile strength to 1400 pounds per square inch from only a few hundred pounds for the unloaded vulcanizate. A uniform increase in tensile strength, laboratory abrasion, and road wear is obtained as particle size decreases. For the carbon blacks shown, the road wear values indicate smaller differences among blacks than are indicated by the laboratory abrasion values. Both the laboratory abrasion and road wear data are, however, in good general agreement. The road wear data represent averages from numerous road tests.

With non-black fillers the same general phenomenon is observed as with the carbon blacks. The finer the particle size of a given material, whether obtained by grinding, precipitation, or flame processes, the more reinforcing it becomes. Fine particle size is associated with high Mooney viscosity, high tensile and tear strength, high abrasion resistance, and lower resilience.

Particle Shape

The electron microscope has made it possible to actually see the particle shape of finely divided solids. Most carbon blacks, silica, and precipitated calcium carbonates consist of spherical or ellipsoidal particles; zinc oxides are needle shaped, and clays are made up of thin hexagonal-shaped platelets.

Particle shape seems to have only secondary effects on reinforcing or vulcanizate properties in contrast to the marked influence of particle size. However, particle shape does influence rubber properties in a number of important ways, particularly processing operations such as milling, calendering, and extrusion. These effects are analogous to the effects of anisometric particles on the viscosity of liquids. For liquids containing rigid, spherical particles at low concentration the viscosity, η, is a linear function of volume concentration. This is expressed by the Einstein equation:

$$\eta = \eta_0 (1 + k\upsilon).$$

The constant k has the value of 2.5 for spheres. For

TABLE III—MPC CHANNEL BLACK IN NEWS INK AND TYPE X-478 BUTADIENE-STYRENE RUBBER

Bulk Density #/ft.³	Viscosity Poises	Coefficient of Thixotropy	Modulus 300%	Tensile Strength
6.5	5.23	1.59	950	4,200
15.0	4.16	1.15	1,040	4,120
22.0	3.91	1.01	1,000	4,150
29.0	3.35	0.55	880	3,630

particles which depart markedly from spherical shape, k can be considerably larger than 2.5, resulting in much higher viscosities at the same volume loading. For equal volume concentrations of two fillers in rubber, one filler having spherical particles and the other needlelike or platelike particles, the mixture containing the anisometric filler would be the stiffer in the unvulcanized state, and have the higher Mooney viscosity. Thus, clays, which are platelike, contribute considerably more stiffness and "green" strength to unvulcanized mixtures than do calcium carbonates of about equal particle size.

Another characteristic of anisometric particles in liquids is their tendency to give rise to non-Newtonian or "thixotropic" systems having so-called "yield points." A practical example of this is the use of "Bentones", derived from platelike bentonitic clay particles, for making heavy lubricating greases. Highly anisometric particles, even in some instances at relatively low loadings, will arrange themselves in semi-permanent, "house of cards" type structures, thus adding to the rigidity and resistance to flow of viscous systems. In an analogous manner, anisometric fillers in rubber give rise not only to low plasticity but also improve "nerve", lower die swell during extrusion, and improve smoothness of calendered and extruded stocks. It is possible that all these desirable effects are due to the introduction of some kind of "structure" built up by the filler, which counteracts the high elasticity of the rubber matrix.

It should be noted that all fillers give rise to similar processing advantages if added to rubber in sufficient quantities. Indeed, the primary reason for adding fillers in some cases is simply to be able to more easily mill, calender, extrude, and mold rubber. Vulcanizate properties may be of secondary importance. Fillers composed of anisometric-shaped particles show these processing effects at a lower loading than fillers composed of more regularly-shaped particles of equal size.

Another characteristic of anisometric particles in a system under shear is their tendency to orient themselves with their long axis in the direction of flow. In liquids this phenomenon is referred to as "streaming birefringence." An example of this orienting effect is the "pearlescence" of talc or ground mica in flowing water suspensions. Anisometric fillers in rubber are aligned in the direction of milling, calendering, and extrusion causing "grain effects." These grain effects often persist in the vulcanized articles, causing a property such as tear strength to be much higher in the direction prependicular to the direction of particle alignment than in the parallel direction.

Degree and Strength of Particle Aggregation

An individual particle can have varying degrees of attraction and association with its immediate neighbors. Generally, large particles such as are found in ground limestone, possessing very litle surface energy because of low surface area, do not form strong associations with their surrounding neighbors. These fillers are essentially unaggregated, and the individual particles can easily be separated and dispersed in air, fluid media, and rubber. Fillers having particle diameters of over 0.5 micron might be considered in this category.

Smaller particle size fillers are characterized by some degree of mechanical aggregation. The individual particles of such fillers can be dispersed in many media, but this requires mechanical shearing action and, in some systems, the additional help of dispersing agents. Most rubber fillers under 0.5 micron in size are in this class.

Excessive packing or compressing of finely divided powders can result in such strong particle aggregates that dispersion to ultimate particles, even under conditions of high shear, is no longer possible. When this occurs the effective working unit is considerably larger than the actual, ultimate particle, and poor results are obtained. Figure 3 illustrates various degrees of particle agglomeration obtained with silicas produced by different wet processes.

It is possible that the strength of agglomeration is such that the degree of dispersion in one system is poor, while in another system where higher shearing forces can be applied to break up the agglomerates the degree of dispersion is good. Table III illustrates this phenomenon for channel black having varying degrees of dry packing in a mineral oil vehicle (news ink) and in rubber.

The effect of dry packing, over the range shown, on the viscosity and thixotropic properties of a news ink is very pronounced. Under the conditions used in the preparation of these inks on an ordinary ink mill the different density black samples disperse to different degrees, the higher density samples showing the poorer dispersion. The higher shearing energy encountered in the rubber system does, however, result in practically uniform dispersion for all the samples. There is an indication that the high-density sample is somewhat more difficult to disperse than the other samples. If the agglomeration of carbon black particles is carried to an extreme, as occurs during excessive mechanical working, its reinforcing characteristics can be seriously affected.

Perhaps the most important type of particle association consists of the formation of strong, fused, chemically bonded, chainlike aggregates. The formation of such aggregates probably occurs simultaneously with the growth of the individual particles. In carbon blacks this characteristic property is called "structure," and it has important effects on rubber properties. That this "structure" is permanent has been established from electron microscope examina-

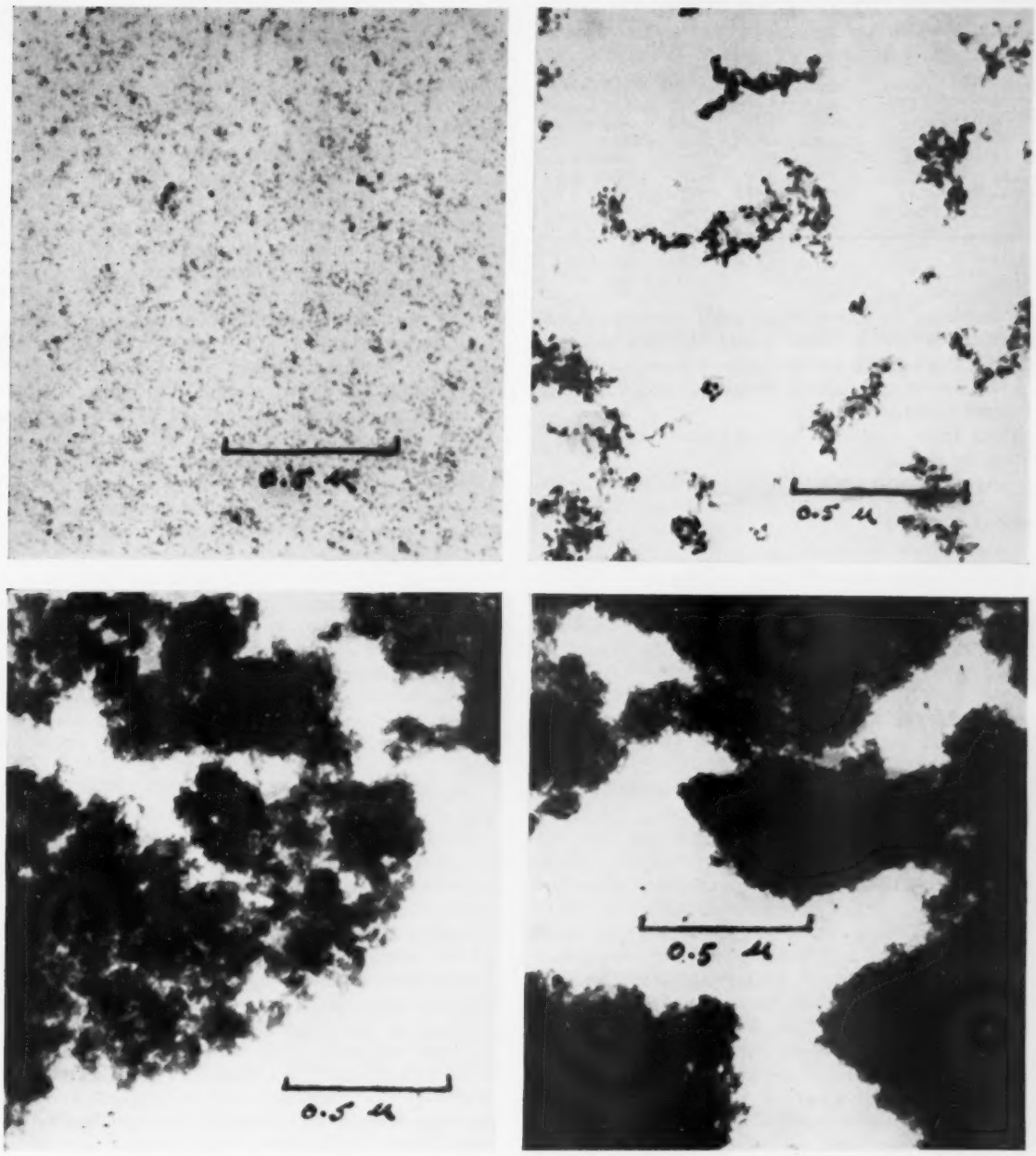

FIG. 3—Various degrees of particle agglomeration obtained with silicas produced by different wet processes.

tion of microtoned rubber sections containing carbon black. In these sections one observes the same chainlike arrays of particles as are seen in the dry black before dispersion. No amount of milling seems to be able to disperse these chainlike aggregates.

In a general way, "structure" of this type gives rise to the same effects as anisometric particle shape. In liquid media structure blacks are very effective thickening agents. In rubber, structure blacks tend to increase the viscosity and stiffness of uncured stocks. An indication of this structure tendency of carbon black is obtained by measuring oil absorption. If carbon black is mixed with oil, the minimum amount of oil required to form a stiff, coherent mass is termed oil absorption, expressed usually as cc of oil per gram of black. Table IV shows the effect of changing "structure" as indicated from oil absorption values on extrusion shrinkage (related to die swell) of butadiene-styrene rubber stocks containing 50 parts of black. The blacks are arranged by decreasing "structure."

TABLE IV—OIL ABSORPTION EFFECT ON PROCESSING

Black	Oil Absorption cc/gram	% Extrusion Shrinkage
Shawinigan Acetylene	1.53	41.6
FEF	1.24	46.2
VFF	0.81	56.8
EPC	0.86	60.0
HMF	0.78	59.2
SRF	0.74	61.7
FT	0.43	63.4

"Structure" in carbon blacks gives rise to a number of effects in rubber. These include the following:

(1) Higher than normal Mooney viscosity values.

(2) Lower processing shrinkage and smoother appearing extruded stocks.

(3) High modulus, high hardness, and shorter breaking elongations.

(4) High electrical conductivity of the vulcanizates.

Surface Properties

Another characteristic of a filler which has an effect on rubber behavior is the activity of the surface towards the rubber matrix; i.e., the nature of the filler surface-rubber interface. Some degree of adhesion between the filler and rubber is desirable for, otherwise, there would be holes in which the filler particles would rattle around. The presence of such discontinuities would result in a mechanically weak structure. Fortunately, there are no known materials which behave in such an unfriendly manner. From all superficial appearances, fillers seem to adhere to the rubber phase.

In some cases, when the filler particles are very large, and where the surface of the particles is smooth, as occurs in crystals, and also when the particle surface is quite hydrophilic or polar, there is evidence that, on stretching, the rubber will pull away from the pigment particles to form vacuoles. An example of such a material is barytes. Vacuole formation has been detected with many other fillers, but it is only of consequence when the particle size is large. Obviously, when such a condition is possible, the filler cannot be considered in the category of a good reinforcing agent. On the contrary, a good reinforcing agent might strengthen the mixture by providing an interface where the bond strength is stronger than the rubber itself. The larger the quantity of rubber associated in such interfacial bonding, the stronger will be the total system. From this it follows that a high interfacial area per unit volume of material is desirable and, therefore, small particle size, to provide the large interface, is the basic property of reinforcing fillers.

The fact that inconsistencies in the relationship between particle size and reinforcement do exist leads one to suspect that these might be due to differences in the degree of bonding at the interface; i.e., differences in "surface activity." Various types or "mechanisms" of filler-elastomer interaction are possible, ranging from no interaction (example previously mentioned of a sphere rattling around in a hole) to complete covalent chemical bonding of the filler surface atoms to elastomer atoms. One can also have other types of bonding due to Van der Waals forces, dipolar attraction, hydrogen bonding, ionic bonding, or other means. In recent years a great deal of research effort and thinking has been expended in trying to determine the physical and chemical phenomena which occur when a filler particle finds itself enmeshed in the tangled jungle of long chain rubber molecules. Although there is no agreement as to the mechanism of reinforcement, there is no doubt that the nature of the surface plays some role, particularly in its influence on pigment wetting and dispersion.

How does the particle find its way into the rubber molecule jungle so it can do its job? Certainly, in fluid media, the surface properties have a profound influence on wetting and degree of dispersion. Hydrophobic pigments wet out more readily and disperse more easily in non-polar vehicles and vice versa. On the other hand, in rubber systems, the influence of surface polarity is probably less important, primarily because wetting or incorporation of the pigment in the rubber is accomplished by high energy mixing devices such as mills and Banburys, and dispersion is accomplished by high shearing forces which break apart agglomerates and separate pigment particles from one another. Good adhesion between the filler and the rubber will, of course, help in this process. Whereas mechanical dispersion is possible with rubbers where high shear can be imposed on the aggregates, it is much less effective in fluid systems because of the inability to put the same type of shearing forces to work.

Reinforcement cannot be attributed to any special type of wetting or polar attraction of the rubber matrix molecules to the filler surface. Reinforcement is observed with polar and non-polar pigments in polar and non-polar rubbers. It is observed with inorganic pigments, and with organic fillers such as some thermosetting resins and lignin. The phenomenon of rubber reinforcement is observed in systems completely different in chemical and physical properties. The common denominator of all these combinations seems to be a two-phase system of small particle size and good dispersion in an elastic matrix.

There is evidence that pigments do not retain their *relative reinforcement ability* when compared in different elastomers. Although more data are needed to prove the point, it appears that finely divided polar pigments are more reinforcing in a polar elastomer than a pigment of the same size but lower polarity. The term "polarity" is used here to mean "hydrophilic" or "water wettable."

Ira Williams *(7)* showed this a few years ago when he compared clays in natural rubber and neoprene. He fractioned clay into coarse and fine fractions, which were tested in the two rubbers. Whereas both the coarse and fine fractions gave the same tensile strength in natural rubber, the fine fraction gave considerably higher tensile strength than the coarse fraction in neoprene. The conclusion from these experiments is that the clay fractions, being polar in nature, could not be adequately wetted and dispersed by the

non-polar natural rubber, and, therefore, the particle size effect of the two fillers was not developed in the rubber. However, in the polar neoprene, the polar clay fractions were wetted and dispersed so that particle size effects on reinforcement could be observed.

Table V shows rubber data comparing hydrophilic silica with relatively hydrophobic carbon black, in a number of elastomers of different polarities. It is obvious, at least from the stress-strain and hardness data, that the carbon black is superior to the silica in the normal, non-polar natural rubber and butadiene-styrene rubber. In the polar rubbers the silicas appear superior to the carbon blacks.

Conclusion

A survey has been made of those filler properties—particle size, particle shape, surface area, degree of agglomeration, and wetting—which are of primary importance in rubber applications. Other very important properties such as optimum loading and effect on cure rate—both of which of course are involved in the practical problem of compound development—have not been discussed. The comparison of fillers, as is usually done in company technical literature, at equal volume loadings and in the same basic recipe, can often give meaningless and sometimes misleading results. A filler must still be judged on the basis of its suitability for each individual product, at the loading level and in the specific rubber recipe which gives the best and most economical performance.

TABLE V—SILICA VERSUS CARBON BLACK

Rubber	Filler	Tensile	Modulus	Hardness
Natural Rubber	Cab-O-Sil	3,400	730	77
(30 volumes)	EPC	4,200	1,720	71
Styrene Rubber	Cab-O-Sil	3,750	1,060	80
(30 volumes)	EPC	4,110	1,930	75
Hycar 1042	Cab-O-Sil	4,130	1,370	85
(30 volumes)	EPC	2,320	1,450	68
Neoprene WRT	Cab-O-Sil	4,440	1,600	63
(20 volumes)	MPC	3,670	1,520	67
Paracril UPBE*	Cab-O-Sil	4,090	1,285	61
(45-53 parts)	Hi-Sil 202	3,740	1,285	64
	MPC	3,950	1,400	63
	HAF	3,420	1,500	61

* Naugatuck Chemical Bulletin, No. 222 (May, 1958).

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(3) Ditmar, R., *Gummi Ztg.*, Vol. 20, p. 579 (1905).
(4) Stillwogen, S., *India Rubber World*, Vol. 99, p. 34 (1937).
(5) Pearson, Henry C., "Pneumatic Tires", India Rubber Publishing Co., New York, p. 47 (1922).
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(7) Williams, I., *India Rubber World*, Vol. 126, p. 359 (1952).

Coming Next Month . . .

Determining the Bound Styrene in Styrene-Butadiene Copolymers—By C. L. Hilton, Research Center, U. S. Rubber Co., Wayne, N. J.

Description of a streamlined method involving nitration and spectrophotometric analysis.

Effect of Ozone on Rubber: Papers Presented at the ACS Rubber Division Meeting.

Condensations of the papers given at two technical sessions held during the Los Angeles meeting.

Food Conveyor Belting—By J. Wallace Rowland, Jr., Victor Balata & Textile Belting Co., Easton, Penna.

Information on one of the most highly specialized segments of the rubber industry, the production of conveyor belting used in food processing.

Evaluating Flexible Foam Materials—By L. A. Rosenthal and G. I. Addis, Development Laboratories, Union Carbide Plastics Co., Bound Brook, N. J.

Description of an instrument which makes possible study in greater detail of the impact properties of flexible foam materials.

PLUS R/A SPECIAL INDUSTRY REPORT

The Incentive Problem in the Rubber Industry.

A detailed examination of wage incentive plans in the rubber industry which throws light on why they are causing management more trouble than almost any other single factor.

Goodyear's Automated Tire Curing Plant

FIG. 1—The new tire curing plant (foreground) is housed in a 140 x 540-foot building which connects to the main factory by a roofed-over conveyor and tunnel system. A 140 x 440-foot basement contains more than five miles of piping required to provide steam pressure to power the tire curing facilities.

IN November, 1957 Goodyear Tire & Rubber Co. opened an installation in Los Angeles, California, which has been described as the world's largest and most fully automatic tire curing plant. The $7½ million dollar factory was planned not only to bring Goodyear's curing facilities up-to-date, but actually to make them the most efficient possible within the framework of modern plant design.

Automation starts from the time an uncured tire, one of a never-ending line, enters the curing plant via hook conveyor from the main building. Within 20 minutes after it reaches a temporary storage rack, it is automatically loaded, shaped, cured, stripped and taken away. Both tube-type and tubeless tires are processed by the 88 presses which are fitted with mold designs to cover the full Goodyear passenger and small truck line.

During the time the plant with its almost completely automated system has been in use, the operation has been efficient and troublefree. It has measured up to every expectation of improved working conditions, lowered costs and higher quality. The accompanying photographs show how a tire is made at the installation.

FIG. 2—Over-all interior view of the world's most fully automated tire curing facility. Four lines contain 88 completely automatic dual presses.

FIG. 3—After entering the plant by conveyor, the green tires are placed on temporary storage racks (right). From there they go to an automatic 5-tire loading magazine (left), which takes them to the press.

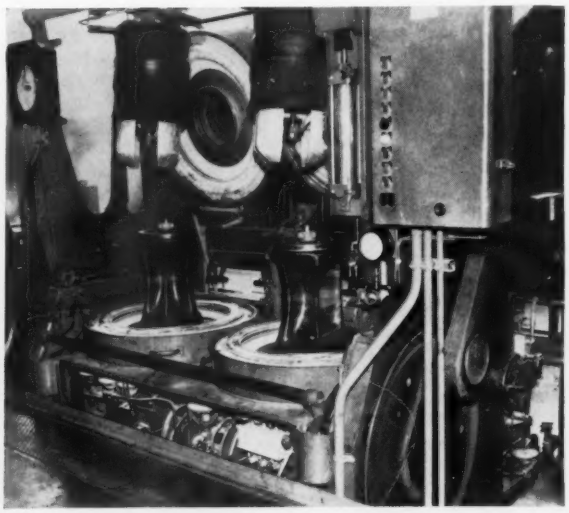

FIG. 4—Green tires about to be dropped into place over the deflated air bladders within the dual press. The tires are received from the loading magazine by chucks which rotate them downward, and contract to release the tires.

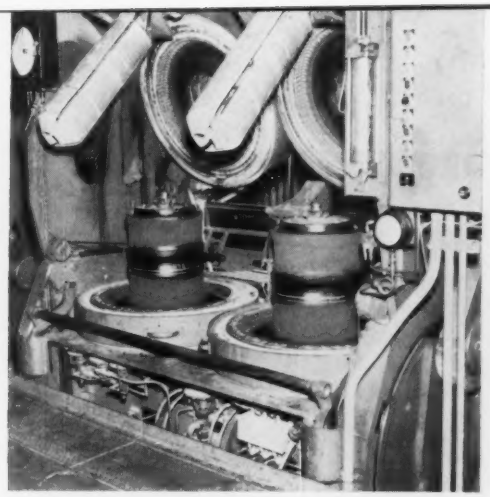

FIG. 5—Uncured tires on the deflated air bladders, which are centered in the lower half of the press mold. After the mold closes, the tires are shaped by 200 pounds of steam pressure, which inflate the bladders and force the tires into the cavities of the mold which provide their exterior design.

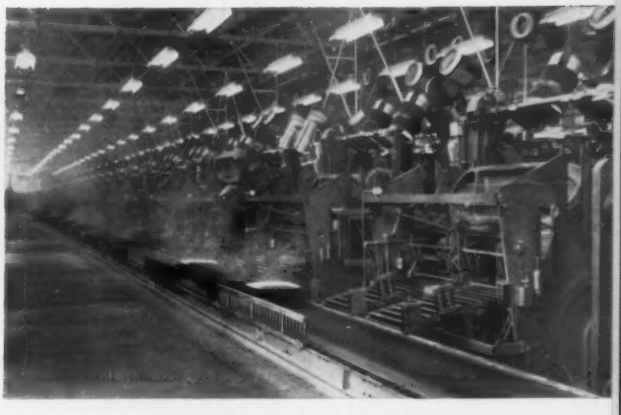

FIG. 8—The steaming tires are ejected from the press to a moving conveyor belt. Four such belts, one for each of the four lines of presses, accumulate the tires at one conveyor which takes them forward to a trimming machine.

FIG. 6—The curing operation. The former 40-minute cycle has been cut in half. After curing, cool water enters the bladder to kill the steam before the bladder is collapsed by vacuum to remove the tire. The mold itself remains continuously hot. Bladders process approximately 760 tires before they have to be replaced.

FIG. 9—From the trimming machine (above) the tires are automatically transferred to a hook conveyor which carries them the length of the building and back for cooling.

FIG. 7—Two steaming cured tires being raised from the press molds. The operation produces 72 tires per mold per day. The horizontal bar will tip the tires toward the rear of the press to eject them.

Goodyear's
Automated
Tire Curing Plant

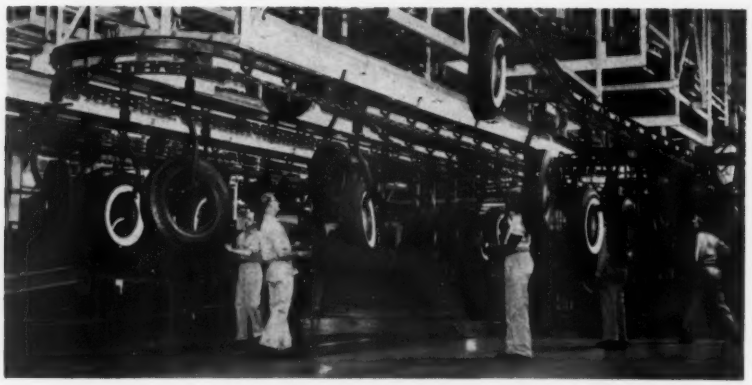

FIG. 10—After cooling, the tires are inspected. Those rejected by the inspectors are removed from regular processing by a turn of the hook. In a matter of minutes the tires will pass to a photo-electric selector which routes white-walls in one direction, blacks in another.

FIG. 11—The blacks enter an electrostatic paint chamber where they are painted by a process which magnetically pulls the paint from gun to tire, a method which distributes the paint uniformly over the surface.

FIG. 12—While the blacks are being painted, the white-walls are buffed, stripped and finished manually. Here they leave a finishing booth via conveyor.

FIG. 13—Both types of tires merge into a single stream where they are balanced and automatically counted. Within 1½ hours after the green tire enters the plant, it is processed and shunted off to a loading dock for shipment, or sent back to the main plant for wrapping and storage.

O-RINGS *for Cylinder Liners of Diesel Engines*

Evaluations of various elastomers for this service

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New York Naval Shipyard,
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DIESEL engines are in extensive use aboard Naval vessels to provide propulsion power, generate electricity and operate auxiliaries. Many of these engines have replaceable cylinder liners, the cooling water to which is sealed from the crankcase by O-ring gaskets.

These O-ring gaskets are compounded from elastomeric materials such as neoprene, nitrile and silicone rubber. They are subjected in service to water at a temperature up to 190°F., hot exhaust gases and lubricating oil fumes. Despite these adverse conditions and long periods of stand-by service, they are required to seal against cooling water at a pressure of 60 psi. Failure of these O-rings cannot be tolerated because their replacement requires dismantling the engine at a cost estimated to be several thousand dollars for a 16-cylinder engine.

These O-rings must therefore be compounded from the best available materials in order for diesel engines to furnish low cost, efficient and dependable power. Accordingly, as part of a development program on elastomeric materials being conducted at the Naval Material Laboratory, an investigation was undertaken to determine the effect on O-rings of conditions that simulate those encountered in diesel engines. This work is a continuation of Navy Department interest in sealing and seal-aging of rubber gaskets reported by Werkenthin *(1)*.

Samples and Test Apparatus

O-rings having an inside diameter from 10 to 13 inches and a cross-section diameter of about ¼ inch were used in this investigation. Three of these samples were compounded from neoprene, five from nitrile rubber and two from silicone rubber. These samples, identified herein by code letters, were obtained from Shipyard stock and commercial sources.

A sketch of the compression stress relaxation apparatus, now specified in ASTM Method D1390-56T *(2)*, is shown in Figure 1. Its essential parts are two parallel steel plates that are used to deform the specimen, the amount of compression being limited by metal spacer bars inserted between the parallel plates. Forming a part of the top plate and actually compressing the specimen is a load-applicator which slides with minimum friction in vertical ball bushings secured to the top plate. The load applicator is insulated electrically from the remainder of the apparatus, except for a flange that is in metal-to-metal contact with the underside of the top plate. A Simpson Model 260 or equivalent meter is connected to measure the resistance at this contact.

The arrangement of the apparatus is such that external force applied to the load-applicator is transferred to the specimen. When this external force exceeds the back or internal restoring force of the specimen, additional compression of the specimen occurs. This additional compression permits separation at the metal-to-metal contact of the flange and the top plate that is detected on the meter. The bottom plate of the apparatus is fitted with a base plug which has a micrometer thread to elevate or depress the specimen relative to the surface of the bottom plate in order to facilitate exact adjustment of the percentage compression of the specimen.

External force can be applied to the load-applicator by any standard compression testing machine conforming to the requirements of ASTM Designation E-4 *(3)* and having a speed approximately 0.05 inch per minute. Any other type of machine may be used provided it conforms to the specified requirements, as for example, a platform scale equipped with a yoke over the platform, as shown in Figure 2.

Procedure for Oven Aging

An oven aging test was designed to simulate the conditions encountered by O-rings when the engine is subjected to long periods of stand-by service. The specimen consisted of an aluminum block, 1 x 1 x 0.444 inch, which had two 5/16 inch wide by 0.178

Note: This paper was presented at the Fifth Joint Army-Navy-Air Force Conference on Elastomer Research and Development, Dayton, Ohio, October 15-17, 1958.

The opinions or assertions contained herein are the private ones of the authors, and are not to be construed as official or reflecting the views of the Navy Department or the Naval service at large.

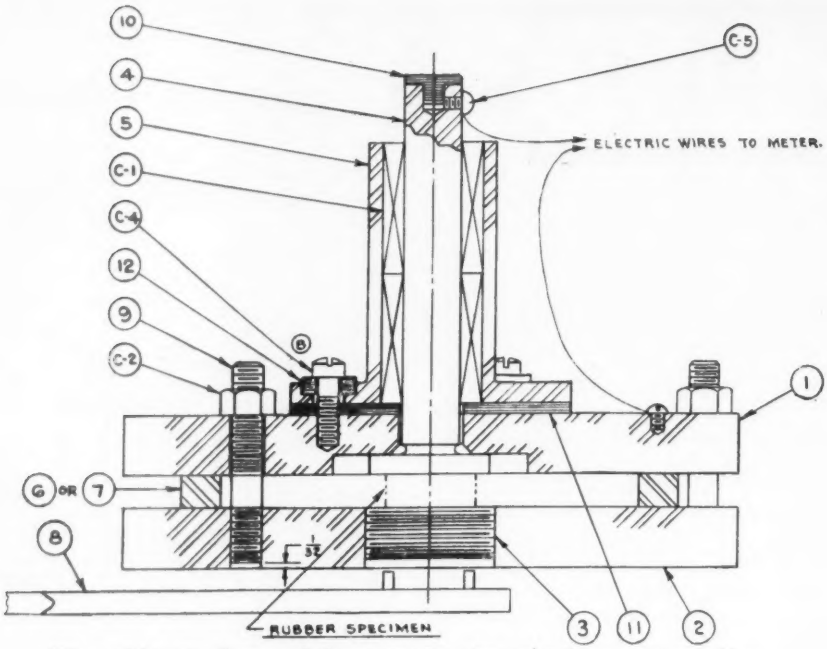

FIG. 1—Schematic diagram of the compression stress relaxation apparatus (rubber specimen is approximately one inch in width).

inch deep grooves in the top surface. Two 1-inch long pieces cut from one O-ring were cemented with MIL-A-1154A *(4)* adhesive material into these grooves to form the test specimen shown in Figure 3.

The stress relaxation apparatus was adjusted to compress the pieces of O-ring material from their original cross-section diameter to a height of 0.187 inch. This width of groove and amount of compression are identical to the conditions to which O-rings are subjected in service. The specimen was centered on the base plug and the apparatus assembled and placed beneath the loading device. External force was applied to the load-applicator at the rate of 0.05 inch per minute until a break in the electrical contact between the flange and the top plate was detected on the meter, thereby indicating that the O-ring material had been compressed to the desired height. Immediately thereafter a stop watch was started, the bolts tightened twice around to a torque of 10 pound-feet and the external force released.

At 3 minutes ± 10 seconds after compressing the specimen, the back load of the unaged specimen was determined by reapplying external force onto the load-applicator and reading the load scale at the instant the change in electrical resistance occurred. The weight of the load-applicator was added to this reading to obtain the total load on the specimen. The assembled apparatus was then aged in a Geer oven for 46 hours at 194 ± 2°F., after which the apparatus was allowed to cool at room temperature for 5 ± ½ hours prior to determining the back load of the aged specimen. Then, while still assembled, the apparatus was replaced in the oven and aged for additional periods of 46 to 94 hours at 194 ± 2°F. until a total aging time of 470 hours was attained.

Following each aging period, the back load of the specimen was determined. This test was made in tripli-

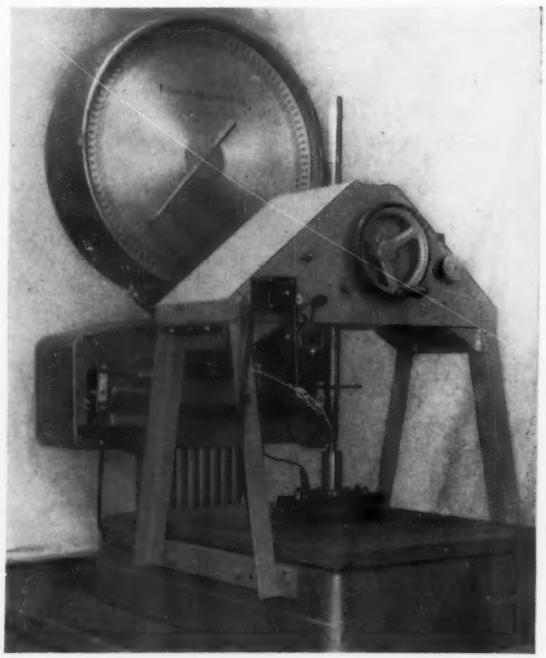

FIG. 2—Compression stress relaxation apparatus mounted on the load scale.

FIG. 3—Test specimen for load relaxation tests.

cate and the average percentage of load retention was calculated from the equation

$$\text{Load Retention, \%} = \frac{L_a}{L_i} \times 100$$

where L_a = Average back load of the specimens following the aging period at 194 ± 2°F., pounds, and
L_i = Average back load of the unaged specimens, pounds.

Procedure for Immersion in Water

An immersion test was designed to simulate service conditions of O-rings during operation of the diesel engine. The procedure used to determine the back load of a specimen in the initial condition was the same as that described for the oven aging test. However, following this determination, the specimen was removed from the apparatus and compressed to the same deformation between compression set plates of the type used for Method 3311 of Federal Test Method Standard 601 *(5)*. The assembled plates were immersed within one hour thereafter in a desiccator containing distilled water at room temperature. This desiccator was then placed in a Geer oven at 194 ± 2°F. for 94 hours. The first 24 hours of this time were considered to be expended in raising the temperature of the desiccator and its contents to that of the oven, and hence were not judged to be part of the specimen immersion period.

After immersion, the specimen was removed from the compression set plates, permitted to recover for two hours at room temperature, then replaced in the stress relaxation apparatus for determination of the back load. This determination was made using the same apparatus and spacer bars as used for the specimen in the initial condition.

Within one hour thereafter, the specimen was recompressed in the compression set plates, reimmersed in a fresh quantity of distilled water in the desiccator, and the immersion test continued. The back load of the immersed specimen was determined thereafter at intervals of 168 hours until a total immersion time of 504 hours at 194°F. was attained. Two specimens of each sample were tested and the average load retention of the specimen was calculated using the equation given previously.

Physical Properties

The tensile strength and elongation of 6-inch long pieces of ¼-inch diameter O-ring material were determined in accordance with the procedures specified in the Methods 4111 and 4121, respectively, of Federal Test Method Standard No. 601 *(5)*. These tests were made on specimens in the initial condition, after aging in a Geer oven for 336 hours at 194 ±

Load Retention of O-Ring Specimens Following Oven Aging and Water Immersion at 194±2°F.

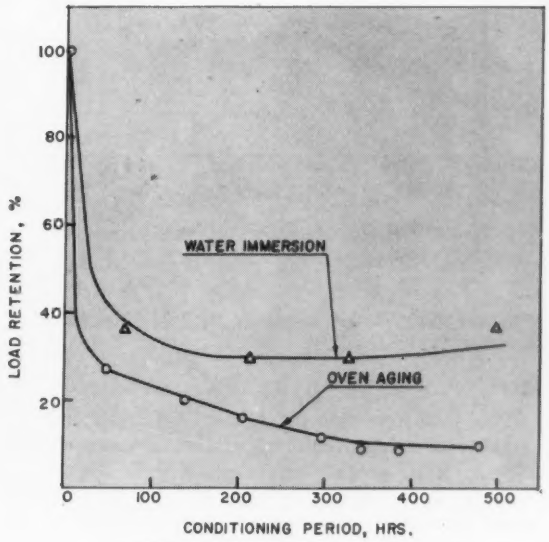

FIG. 4—Code A-1 (neoprene).

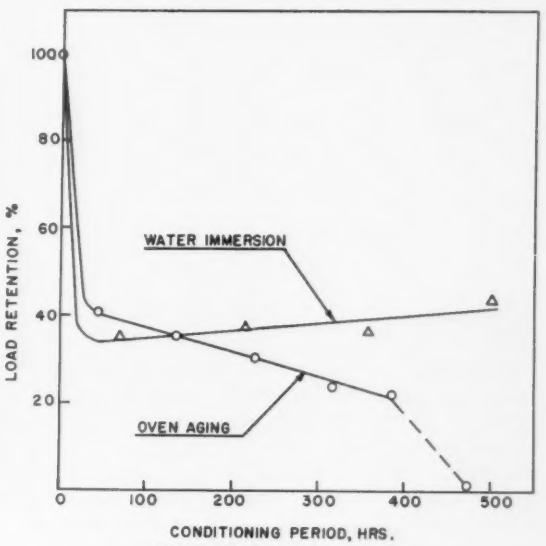

FIG. 5—Code B-1 (neoprene).

Load Retention of O-Ring Specimens Following Oven Aging and Water Immersion at 194±2°F.

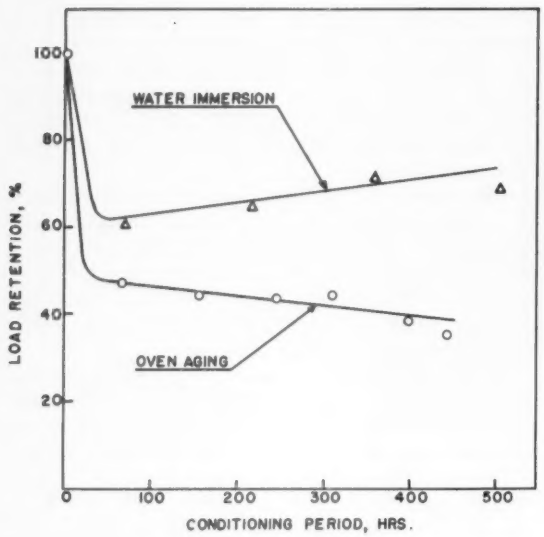

FIG. 6—Code C-1 (neoprene).

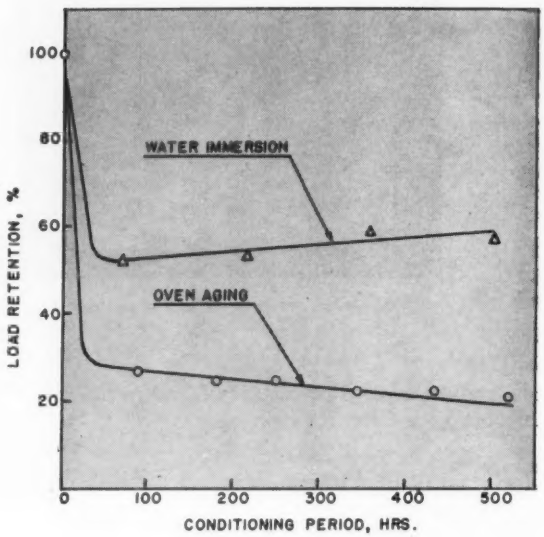

FIG. 7—Code A-2 (nitrile rubber).

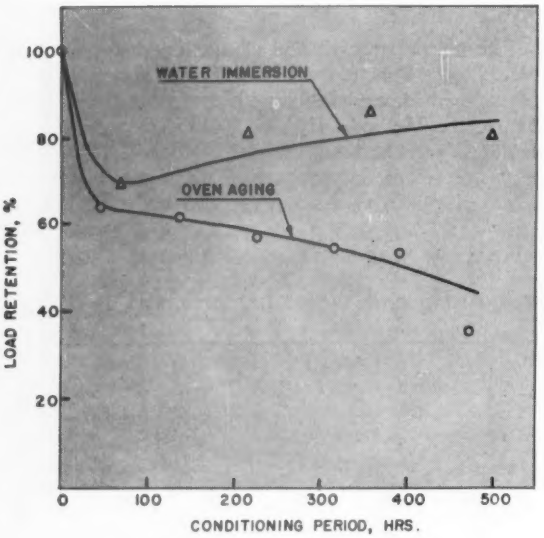

FIG. 8—Code B-2 (nitrile rubber).

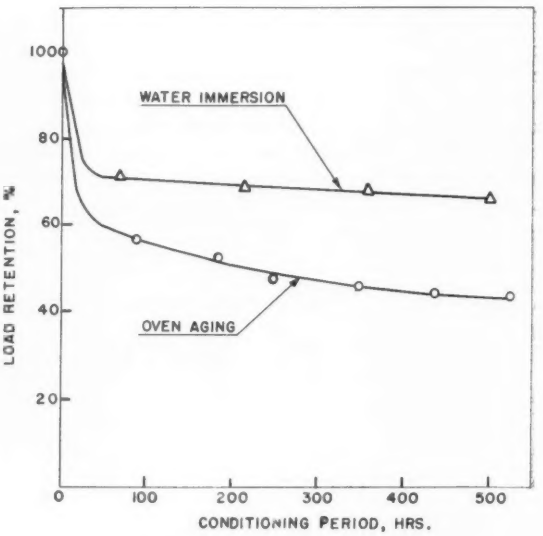

FIG. 9—Code C-2 (nitrile rubber).

2°F., after immersion in distilled water for 336 hours at 194 ± 2°F. and after immersion in ASTM No. 2 oil for 94 hours at 194 ± 2°F. The immediate deterioration properties of the immersed specimens were determined in accordance with Method 6111 of Standard No. 601 *(5)*.

In addition, the increase in volume of 2-inch long pieces of O-ring material after immersion in distilled water for 336 hours at 194 ± 2°F. and after immersion in ASTM No. 2 oil for 94 hours at 194 ± 2°F. were determined in accordance with Method 6211 of Standard No. 601 *(5)*.

Results

The load retention of Codes A-1 through E-2 samples following oven aging and water immersion at 194 ± 2°F. are shown graphically in Figures 4 through 13, inclusive. A tabulation of the basic elastomeric ingredient, cross-section diameter and initial back load of the samples is as follows:

Load Retention of O-Ring Specimens Following Oven Aging and Water Immersion at 194±2°F.

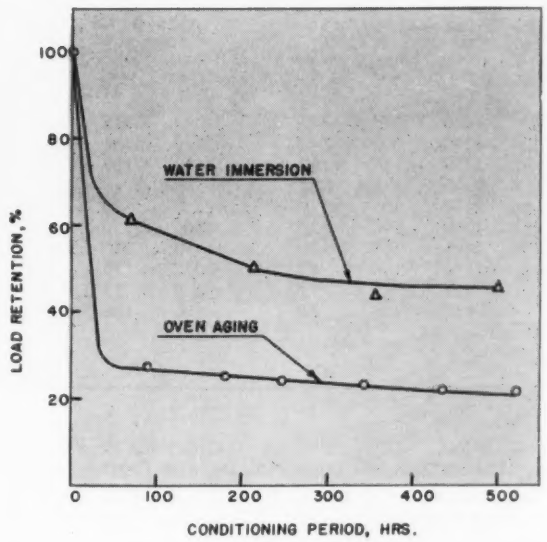

FIG. 10—Code D-1 (nitrile rubber).

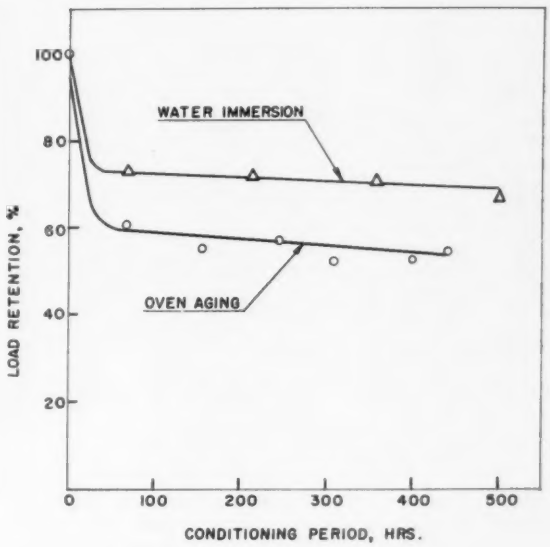

FIG. 11—Code E-1 (nitrile rubber).

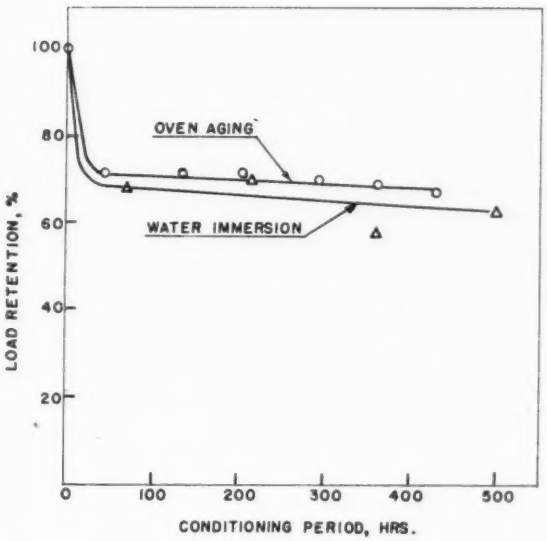

FIG. 12—Code B-3 (silicone rubber).

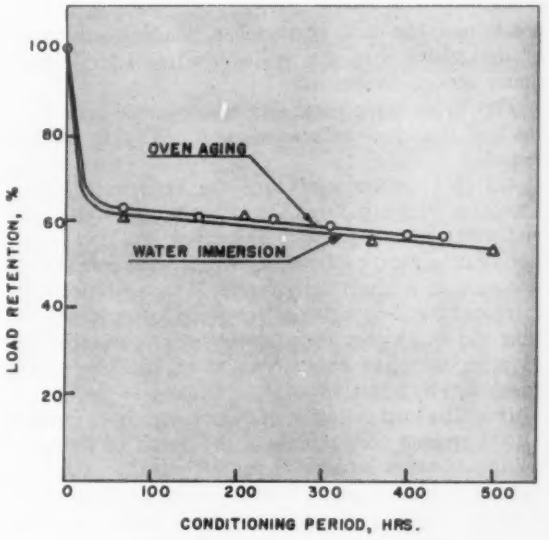

FIG. 13—Code E-2 (silicone rubber).

Code	Basic Elastomeric Ingredient	Cross-Section Diameter, in.	Initial Back Load, lb.
A-1	Neoprene	0.248	50.0
B-1	Neoprene	0.244	50.5
C-1	Neoprene	0.250	91.6
A-2	Nitrile rubber	0.283	196.5
B-2	Nitrile rubber	0.236	36.7
C-2	Nitrile rubber	0.246	50.6
D-1	Nitrile rubber	0.274	182.1
E-1	Nitrile rubber	0.248	84.2
B-3	Silicone rubber	0.236	53.2
E-2	Silicone rubber	0.245	42.1

The tensile strength, elongation and volume swell properties of the O-ring samples are tabulated in the accompanying table.

Discussion

The elastic action of a compressed synthetic rubber gasket material is due to compression of infinitesimally small molecular springs. These molecular springs when compressed for long periods of time under static conditions take a permanent set. In addition, compression

TENSILE STRENGTH, ELONGATION AND VOLUME SWELL PROPERTIES OF O-RING SAMPLES

Code	Basic Elastomeric Ingredient	Initial condition: Tensile Strength (psi)	Initial condition: Elongation (%)	After oven aging for 336 hours at 194 ± 2°F.: Tensile Strength (psi)	After oven aging for 336 hours at 194 ± 2°F.: Elongation (%)	After immersion in Distilled water for 336 hours at 194 ± 2°F.: Tensile Strength (psi)	Distilled water: Elongation (%)	Distilled water: Volume Swell (%)	After immersion in ASTM Oil No. 2 for 94 hours at 194 ± 2°F.: Tensile Strength (psi)	ASTM Oil No. 2: Elongation (%)	ASTM Oil No. 2: Volume Swell (%)
A-1	Neoprene	1200	360	1430	390	670	335	84.8	1090	415	13.7
B-1	Neoprene	2130	320	2170	250	1290	200	24.7	2330	335	11.5
C-1	Neoprene	2350	205	1840	135	1750	155	16.3	2120	190	18.8
A-2	Nitrile rubber	2020	350	2060	305	1900	295	13.2	*	*	*
B-2	Nitrile rubber	2270	500	2300	415	2130	405	8.7	2250	450	0.0
C-2	Nitrile rubber	2080	385	1510	240	1250	290	32.5	1500	280	5.4
D-1	Nitrile rubber	1280	235	1640	200	1430	185	13.4	1480	250	–0.3
E-1	Nitrile rubber	2550	250	1990	140	1750	150	6.2	2070	170	1.3
B-3	Silicone rubber	380	65	450	55	310	45	9.0	220	35	7.1
E-2	Silicone rubber	450	80	660	100	640	105	2.0	580	105	9.1

* Insufficient material to make test.

causes a rearrangement in the orientation of the molecular chains in the gasket material with subsequent decay in spring-back characteristics and reduction in the back load that the gasket exerts against the compressing surfaces. With the compression stress relaxation apparatus the back load of the gasket material can be determined within three minutes after compression and following exposure to simulated service conditions. The ratio of these back loads is a measure of the retention of the sealing ability of the gasket under service conditions.

The following generalizations are made regarding the load retention characteristics of the O-ring samples tested:

(a) The load retention of the neoprene O-rings decreased very rapidly at the outset of the oven aging and water immersion tests. Thereafter, the load retention of specimens subjected to oven aging continued to decrease at a much slower rate. The load retention increased for the specimens subjected to water immersion and was higher than for the specimens subjected to oven aging, probably because of swelling of the specimens by water.

(b) The load retention of the nitrile rubber O-rings also decreased very rapidly at the outset of the oven aging and water immersion tests. Thereafter, the load retention of the specimens subjected to oven aging continued to decrease with continued aging, but at a slower rate than for the neoprene specimens. The load retention of the specimens following water immersion was higher than for the specimens subjected to oven aging, probably because of swelling of the specimens by water.

(c) The load retention of the silicone rubber O-rings decreased very rapidly at the outset of the oven aging and water immersion tests. Thereafter, the load retention of the specimens decreased slightly with continued oven aging and water immersion. Contrary to the results obtained in tests on the neoprene and nitrile rubber samples, water immersion did not have a beneficial effect on the load retention of the silicone specimens.

The data in the table indicate that O-rings having the largest cross-section diameter likewise have the largest initial back load. This is consistent with the fact that the larger diameter samples were compressed to a greater percentage of their original diameter. The increase in tensile strength of some samples following heat aging indicates that these samples were apparently furnished in an undercured condition.

Conclusions

The load retention properties of O-rings compounded from nitrile rubber and silicone rubber were higher than for those compounded from neoprene.

Stand-by service (simulated by oven aging) has a greater deleterious effect on load retention of neoprene and nitrile rubber O-rings than active service. However, for O-rings compounded from silicone rubber, there is comparatively little difference between stand-by and active service.

The apparatus and test procedures described herein are apparently suitable for evaluating O-ring gasket materials subjected to simulated service conditions and for laboratory work in developing improved O-ring gasket materials.

ACKNOWLEDGMENT

The authors gratefully acknowledge the cooperation and guidance of C. K. Chatten in the preparation of this article and of E. Solon and H. Jacobs for performing the required tests.

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Barium-Cadmium Stabilization of PVC

The versatile barium-cadmium stabilizers have been developed to a point where they can meet almost any vinyl processing or end-use requirement

By NORMAN L. PERRY

Argus Chemical Corp., Brooklyn, New York

MOST technicians who deal with plastics know that a vinyl stabilizer is a combination of materials added to a vinyl compound to prevent discoloration during processing and premature degradation during use. Although an ideal stabilizer would prevent polymer degradation and decomposition, the materials that are added to vinyl compounds as stabilizers are not capable of preventing breakdown. Decomposition during processing will continue, whether or not stabilizers are present; but the proper choice of stabilizer will moderate the rate and type of breakdown. The prime purpose of the stabilizer system is to direct the decomposition to a colorless and thus unobjectionable form.

The exact nature of the chemical reactions that take place during heating of a vinyl compound are not fully understood. It is known that HCl will split out, that depolymerization and cross-linking will occur, and that carbonyl and carboxyl groups will form. The unstabilized compound will become highly colored, presumably due to the formation of conjugated polyene groups. However, proper combinations of metallic salts and organic additives will prevent outward manifestations of degradation by preventing the formation of these conjugated polyene structures. The manner in which stabilizers act to inhibit color formation is not completely understood. Stabilization is still an empirical science, and the purpose of this paper is to discuss in an empirical fashion the effect of the various substances used in a typical barium-cadmium type stabilizer.

Historical Development of Stabilizers

Among the first materials successfully used as vinyl stabilizers were the inorganic lead salts and various organo-tin compounds. The lead salts provided excellent stability but they had several drawbacks. They could only be used in opaque or translucent compounds, and they stained quite badly in the presence of sulfides. The alkyl tin salts, which gave excellent clarity and freedom from sulfide stain, were very expensive materials.

Thus there was considerable interest in the possible use of stabilizer systems based on metals other than lead or tin. In this early work, cadmium naphthenate appeared promising. When cadmium naphthenate was used to stabilize a vinyl compound, excellent initial color and clarity were obtained. Over-all stability, however, was poor since the compound would suddenly turn black after a relatively short heating cycle. In addition, the cadmium naphthenate presented an odor problem.

The odor problem was overcome through the development of cadmium-2-ethylhexoate for use in place of the naphthenate. It was still necessary to improve over-all stability and the alkaline earth metals appeared promising in this respect. The most satisfactory alkaline earth compound found for extending stability was barium ricinoleate. A combination of barium ricinoleate with cadmium octoate thus became the first extensively used barium-cadmium system.

Interestingly enough, the ricinoleate salt provided better heat stability than the barium salt of a saturated acid. A likely reason for this was that the double bond present in the ricinoleate portion of the molecule was susceptible to oxidation and therefore functioned as an antioxidant. This was not completely satisfactory since the oxidation products formed were colored and caused the vinyl compound to darken. Also, initial color of this first barium-cadmium system was somewhat on the yellowish side.

Since the antioxidant function of the ricinoleate was of definite benefit, a search began for other materials that would serve as antioxidants. The search terminated with the development of tertiary phosphites for use in vinyls. It was found that the addition of small amounts of a tertiary phosphite stabilizer to a barium-cadmium combination could double or triple heat stability. With a phosphite stabilizer present, excellent stability could be obtained with saturated barium-cadmium combinations.

At just about this same time, the first high speed calenders were developed and put into operation.

Note: This article is based on a talk presented before the Eastern New England section of the Society of Plastics Engineers, Boston, Massachusetts, March 21, 1957.

Processors found that the stability that had been satisfactory at slow speeds was completely unsatisfactory at speeds of 80 yards per minute or more. The new barium-cadmium-phosphite systems could not have been developed at a more opportune time, since they provided the stability required for high speed, high temperature calendering.

There were, however, several drawbacks to these soap systems. The ricinoleates still tended to give rather poor initial color. The laurates undoubtedly would have replaced the ricinoleates if the saturated materials did not tend to cause plate-out on the calender rolls. Both systems were used quite widely until the epoxy plasticizers were introduced about 1950.

A Difficulty with Epoxies

The epoxies were included in vinyl compounds in order to improve over-all heat stability and light stability and, at this time, the vinyl industry ran into a really severe case of tack formation and exudation. The cause of this exudation was traced to the use of epoxy plasticizers in conjunction with unsaturated materials such as ricinoleate soaps. An unsaturated compound and an epoxy plasticizer interacted, on exposure to light, to produce incompatible by-products that appeared in the form of surface exudation. Recognition of this fact led to a decline in the popularity of the ricinoleates as stabilizers, and saturated metallic laurates came into pre-eminence.

The effect of cadmium salts on "cleaning up" color may be demonstrated by charging to a two-roll mill, at 325°F., a compound stabilized with 1.2 parts of barium laurate and one part of a phosphite stabilizer. After five minutes, the compound appears to be reddish. If, at this time, 0.8 parts of cadmium laurate is added on the mill and mixed in, the color becomes progressively lighter with increased milling time. The addition of the cadmium does not reverse or even necessarily retard degradation; but it does direct decomposition to a colorless and thus unobjectionable form.

Thus, in the presence of phosphite stabilizer, the cadmium is directing decomposition to a colorless form, probably by breaking up the conjugated double bond structure that forms when PVC splits out HCl. The barium directs decomposition to a form which encourages over-all length of stability. The barium and cadmium combined give good stability with good color.

The similarity between zinc and cadmium in stabilizing action was mentioned above and it is found that the use of zinc in conjunction with a barium-cadmium stabilizer can improve stability. The degree of stability improvement obtained and the amount of zinc used appears to be primarily a function of resin choice. With certain resins, best heat stability results are obtained when a relatively high amount of a zinc containing stabilizer is used in conjunction with the barium-cadmium. Domestic plastisol resins, for example, are very markedly helped stability-wise by high zinc level. Other resins can tolerate very little zinc.

The question naturally arises as to the differences between these various resins that affect stabilizer choice. If all PVC resins consisted of 100% polyvinyl chloride, they would act quite similarly from a stability standpoint and the work of the vinyl formulator and the stabilizer manufacturer would be very much simplified. In practice, however, all commercial resins contain some impurities, probably ranging from about 0.1 to 5% of the resin. These impurities are left over from the polymerization step and may consist of buffering agents, suspension agents or emulsifying agents.

Influence of Vinyl Resin Contaminants

As indicated earlier, stabilizers are added to a vinyl compound to direct decomposition to a colorless and thus non-objectionable form. The contaminants in a vinyl resin also exert an influence on the type of vinyl degradation which will occur. For example, sodium and calcium compounds exert the same directing type of influence as barium, i.e., they extend over-all stability. Unfortunately, their use in stabilizers is limited because they tend to give a compound poor initial color which is very difficult to overcome.

Alkali metal salts, however, are present in domestic plastisol resins since they are used as emulsifying agents during polymerization. The influence of such materials in directing decomposition to the reddish side can be overcome through the use of cadmium or zinc stabilizers, both of which tend to improve color. A low barium-high cadmium system is quite expensive; good color is difficult to achieve through the use of only barium and zinc; a barium-cadmium-zinc combination, however, meets all the requirements of reasonable cost and good stability, and is the basis of many plastisol stabilizing systems.

In addition to its use for stability improvement, zinc is often used in conjunction with a barium-cadmium system to make a vinyl compound resistant to sulfide staining. A compound stabilized only with a barium-cadmium stabilizer will become yellow in the presence of sulfides. If zinc is present in the compound, however, sulfide stain characteristics will be considerably reduced or eliminated.

If a compounder wishes to formulate a sulfide-stain resistant compound, and he is working with a resin that is not tolerant to the presence of zinc, he has to find a way of overcoming this intolerance. The most practical way of doing this is through the use of an epoxy plasticizer, which will forestall blackening.

This leads to a consideration of the function of epoxy plasticizers, which were mentioned earlier. About five parts of an epoxy plasticizer are included in most vinyl formulations to take advantage of the heat and light stabilizing action provided by this family of plasticizers. The effect of an epoxy plasticizer on heat stability is to extend over-all resistance and thus give the processor some insurance that his compound will not suddenly turn black.

Possibly more important is the effect of an epoxy plasticizer on light stability when used in conjunction with a barium-cadmium stabilizer system. Outdoor

Barium-cadmium systems—

- **Are being used in calendered and extruded compounds, plastisols, and rigid, unplasticized compounds.**
- **Can give crystal clarity, freedom from sulfide stain, and freedom from calender plate-out.**
- **Provide outstanding heat and light stability.**

Their widespread acceptance is proof of their extreme versatility and efficiency.

weathering tests have shown that the presence of five parts of an epoxy plasticizer can triple or quadruple the service life of a product.

The choice of epoxy plasticizer type is dependent upon the other properties desired. If polymeric properties are required, one of the epoxidized soybean oils should be selected; on the other hand, if polymeric properties are not required, one of the monomeric epoxy plasticizers will provide improved low temperature flexibility.

Thus, barium-cadmium systems have been developed to the point where they can be used to satisfy almost any processing or end use requirement. They are being used in calendered and extruded compounds, plastisols, and rigid, unplasticized compounds. They can give crystal clarity, freedom from sulfide stain, and freedom from calender plate-out. They provide outstanding heat and light stability. Their widespread acceptance is proof of their extreme versatility and efficiency.

Epoxy plasticizers used in a vinyl compound containing only saturated materials give no difficulty. But if an unsaturated material is added in the form of stabilizer, plasticizer, or lubricant, tack will develop. This also explains the difficulty experienced with the use of epoxy plasticizers with high iodine numbers, where the unsaturation is carried into the compound with the epoxy. Early epoxy plasticizers presented such a difficulty due to their high iodine value. The more recently developed epoxy plasticizers with a low residual degree of unsaturation do not give this difficulty. Thus, barium-cadmium laurate in conjunction with a phosphite stabilizer and epoxy plasticizer became the most popular combination for use in calendering.

This system had some disadvantages, however. As was mentioned earlier, calender plate-out tended to occur (especially in unfilled compounds); crystal clear compounds were still not obtainable; sulfide-staining characteristics, while considerably improved over that of lead, were not eliminated; heat sealing and printing was sometimes a problem at high stabilizer levels; lubricant level was tied to the amount of stabilizer used.

It was felt that a compatible, liquid, non-lubricating stabilizer system would overcome many of these objections. The result was the development of the liquid phenate stabilizers. Barium, cadmium, and phosphite were all combined in a single liquid package. The use of the liquid phenates resulted in the elimination of calender plate-out as a problem. In addition, since the phenates were more compatible than the soaps, heat sealing and printing properties were improved. Lubricant level could be adjusted, as required, through the addition of stearic acid.

Added stabilizing value was also obtained since the decomposition product of the phenate stabilizer was an alkyl phenol which acted as an antioxidant. Compounds containing sensitive pigments such as B. O. N. or Lithol Rubine reds could be calendered without color shift during processing. The development of the phenate liquid stabilizers has thus resulted in gradual replacement of the older soap type of system.

Barium-cadmium stabilizers are today very often used in conjunction with zinc organic salts. This leads to a consideration of the origin of the use of zinc salts as stabilizers. In many respects, zinc is similar to cadmium. They are in the same group in the periodic table. Also, in a vinyl compound, they tend to give the same type of stabilizing action, i.e., they give good color for a short period of time and then suddenly go black. Zinc salts are considerably more reactive in this respect than cadmium should be used carefully.

The Korean crisis sparked a great deal of interest in the possible use of zinc in place of cadmium due to the shortage that developed in the cadmium supply. A limited amount of success was obtained with strontium-zinc and barium-zinc combinations; but of greater interest was the discovery that zinc salts used in conjunction with barium-cadmiums could offer a definite advantage in improving color stability. The barium-cadmium-zinc combinations came into being.

Recent developments in the barium-cadmium field have seen the introduction of modified phosphites to provide still better color and crystal clarity when used in conjunction with liquid barium-cadmium stabilizers. High cadmium-low barium soaps have been developed for use in the manufacture of rigid PVC.

Individual Components and Stability

The stabilizing action of a barium-cadmium-phosphite system is an excellent example of synergistic action. The combination provides far better stability than can be obtained with any one or two of the components.

The effect of the barium, cadmium and phosphite components may be investigated by incorporating them individually and in various combinations into a vinyl compound.

The effect of the various additives can then be determined by testing the heat stability of the compounds at 350°F. in an air circulating oven. Every 15 minutes a sample is removed from the oven and mounted on a chart. A complete visual comparison of the effect of the additives in preventing color formation is thus obtained. For this test a simple vinyl compound consisting of 100 parts of a suspension polymerized PVC and 50 parts of dioctyl phthalate may be used.

The addition of two parts of barium laurate results in no noticeable color stability improvement compared to the unstabilized compound. The compound becomes reddish-brown very quickly and becomes progressively darker with increased heat aging.

A definite improvement in stability is obtained through the use of two parts of cadmium laurate. Excellent color stability is obtained for 15 minutes, followed by sudden blackening at 30 minutes. This is similar to the results obtained from the old cadmium naphthenate or octate stabilizers mentioned earlier. Some progress has been made, however, in obtaining at least 15 minutes of good color.

The addition of a tertiary phosphite stabilizer to the cadimum laurate will extend over-all stability significantly. This makes possible the use of smaller amounts of the expensive cadmium salt. For example, just 0.8 parts of cadmium laurate with one part of a phosphite stabilizer gives twice the stability obtained with two parts of cadmium laurate alone. Interestingly enough, the phosphite by itself has no color stabilizing action whatsoever. The addition of 1.2 parts of barium laurate to the cadmium laurate-phosphite combination further extends stability, while maintaining good color. A complete barium-cadmium laurate and phosphite system has thus been developed.

Portable Photocopier Speeds Laboratory Research

A PORTABLE photocopier machine is used by the Sponge Products Division of B. F. Goodrich Co. to speed up dissemination of laboratory reports and to facilitate magazine research. Manufactured by F. G. Ludwig, Inc., 209 Coulter St., Old Saybrook, Conn., the Contoura-Portable, as it is called, is a versatile brief-case machine which can be carried from office to office, requires no special skill to operate and takes normal lighting and the same setting for all copy.

The Division has made use of the new machine during research on a new process, designated Freeze-Agglomeration, for converting a low-solids latex into synthetic high-solids latex suitable for foam rubber. A technician, for example, who ran a centrifuge operation to determine particle-size distribution of the latex plotted results on a graph. The graph was then immediately put on the photocopier and a required number of duplicates made for others working on allied tests. This was no small operation since graphs for each of hundreds of runs had to be duplicated.

Copies of articles in magazines and books can also be made with the machine. The manufacturer says that it is the only photocopier equipped with an inflatable plastic cushion compatible with the contour of bound books. This permits following the contour right to the margin to produce a crisp, black, permanent copy of anything printed, written or drawn in only 30 seconds.

From time to time, researchers are called on to give lectures. In an emergency, it is possible to gather required information speedily with the aid of the photocopier. When slides are used, they also can be prepared by the machine, which prints the material to be projected directly onto film. The photocopier in the laboratory is a valuable subsidiary tool in achieving productive scientific research.

A technician making a copy of one of the many graphs produced during research of the Goodrich freeze-agglomeration process. She averaged 4 or 5 copies of hundreds of graphs in a typical week.

A 300/150-hp, 4160-volt, 585/293-rpm induction motor with silicone rubber-insulated stator coils driving a Banbury mixer.

The Modern Cage Motor

Improved design has produced more efficient operation for the rubber manufacturer

By F. C. OSTERLAND
Motor and Generator Dept., Allis-Chalmers Mfg. Co., Milwaukee, Wisconsin

THE SQUIRREL-CAGE induction motor, widely applied in rubber mill service, is a highly efficient machine whose periods of trouble-free service can be considerably prolonged by systematic care. Today, new insulation systems have reduced maintenance requirements to the point where it can be called a "modern" motor. If the motor is a large machine, with form wound stator coils, they are protected with a unique silicone rubber insulation. Smaller motors with random or mush-wound coils have the windings firmly embedded in and protected by a block of epoxy resin.

These new materials in open motors are making it possible to disregard many plans of motor protection and maintenance steps needed to keep a conventional motor in good operating condition. Such precautions as guarding against moisture, carbon black, oil or vapors, or regular cleaning and revarnishing of windings have been outmoded. Users can forget about ambient conditions, total enclosures or special ventilating arrangements. At the same time, the maintenance job is simplified and motor life prolonged.

Silicone rubber-insulated stator coils can be vulcanized and sealed so well that motors can be tested at high voltage while fully immersed in water. Epoxy-encapsulated motors have been load-tested for hundreds of hours operation while fully immersed in salt water. Abrasive or conductive dusts have little effect. Oils, chemicals, vapors and other contaminants are sealed out.

For the rubber industry this new concept is working out in practice to reduce the maintenance burden. Carbon black, for example, has been the industry's most troublesome contaminant with respect to motor insulations. Conductive carbon particles are so fine that they penetrate the best sealed conventional coil structures.

In a recent plant shutdown, Banbury drive motors with silicone rubber-insulated coils were dismantled and inspected. After years of service in a badly contaminated carbon black area, there was no sign of coil deterioration.

Diagnosis and Treatment of Motor Ailments

Symptoms	Possible Ailment	Cure
	SYMPTOMS YOU CAN SEE	
(1) Fine dust under coupling employing rubber buffers of pins.	Misalignment.	Realign set.
(2) Motor will not start.	Usually line trouble—single-phasing at starter.	Check source of power supply. Do not merely try to make it go—while motor sits there and "fries!"
	Load too heavy. Disconnect motor to see if it starts without load.	Reduce load—or replace motor with unit of greater capacity.
	SYMPTOMS YOU CAN HEAR	
(3) Excessive hum.	Uneven air gap. Measure with feelers.	Replace bearings—do so before the introduction of scraping noise indicates rotor is rubbing against stator.
	Unbalanced rotor. Check on parallel bars.	Balance with weight attached by cap screw and lock washer.
(4) Regular clicking.	Foreign matter in air gap.	Take out rotor; remove matter.
(5) Rapid knocking.	Misalignment — probably causing shoulder of shaft to pound periorically against bearing end.	Realign set until knocking disappears.
	SYMPTOMS YOU CAN FEEL	
(6) Vibration.	Misalignment.	Realign set.
	Vibration in driven machine. Run motor disconnected for check.	Eliminate source in machine, if possible. Or change to a flexible belt drive may be in order.
(7) Vibration — following motor repair.	Rotor out of balance, due to holes drilled or weights shifted, or new rotor coil or coils.	Balance rotor.
(8) Motor over-heating (check with thermometer, do not depend on hand).	Overload. Measure load; compare with nameplate rating.	Check for excessive friction in motor, drive or machine. Reduce load, or replace motor with unit of greater capacity.
	Dirt. in motor. Check flow of ventilating air.	Blow out motor. Clean wound section if necessary.
	Rotor rubbing on stator.	Replace bearings.
	Shorted stator windings.	Test with wattmeter and correct.
	Ground.	Locate with test lamp or growler and repair.
(9 Bearing over-heating.	Misalignment.	Realign set. And in this—as in all cases of bearings over-heating—keep shaft turning until bearing is cooled to prevent "freezing."
	Too much tension in chain or belt drive.	Reduce tension to point of adequacy.
	Excessive end thrust.	Reduce thrust from drive or machine. (Shaft should be permitted reasonable "axial" float.) Of if motor is off level, shim-up lower end to take thrust off its bearing.
(10) Bearing over-heating.	Too much grease (ball or roller bearing).	Relieve supply to point set by manufacturer.
	Sticking oil ring (sleeve bearing).	Clean, repair, or replace—as necessary.
	Insufficient lubricant.	Add lubricant to the point set by manufacturer.

Temperature Limitations

Certain precautions remain to be observed, however, to assure carefree operation of this modern motor. First, a word of warning about motor loading. Silicone-rubber insulations are inherently Class H, and can take operating temperatures of 200°C. or more. Quite often, however, the machine will be rated far more conservatively, with Class A or B temperature limits, despite the insulation's capability.

Watch the nameplate rating for temperature guarantees. The insulation can take a lot of heating during overload if it is Class H and the machine is rated for B or A temperature rise, but chances are that the bearings and their lubricant will not stand up against excessive temperature. Mechanical fits in the machine, too, may give trouble. Your motor loses its efficiency when temperature guarantees are exceeded, and could fail to pull the overload.

There is more power available in these new motors, with their open construction, than in the same rating of the enclosed type. Open machines have a 115 per cent service factor, and are designed to run continuously at 115 per cent of rated horsepower. Enclosures are added at the expense of this overload capability, and standard enclosed types have a service factor of only 100 per cent. Added service factor can be a lifesaver in emergencies.

Also to be Watched

Forget the insulation, but watch for mechanical troubles, as with bearings and alignment. In theory no wear can take place within an electric motor's bearings if the surfaces are smooth, properly aligned and lubricated. In actual practice, however, bearings often get an inaccurate supply of lubricant, the wrong lubricant, or so much load that the lubricating film breaks down. Preventing these conditions is one of the main jobs of motor maintenance.

In the fight against friction, pay close attention to manufacturer's lubrication instructions. They generally specify type and grade of lubricant, frequency and method of lubrication. Do not try to guess what grade or type to use. Although it is one of the lowest-cost items in operating expense, nothing is apt to cause more trouble and expense than improper lubrication.

Where motors have sleeve bearings, it is important to see that oil rings are free and turning with the shaft. At regular intervals, best determined by local conditions, the oil reservoir should be flushed out, refilled, and the dust seals checked.

In motors having ball or roller anti-friction type bearings, the main purpose of grease is to guard the steel rolling elements and races from corrosion, not friction. Too much grease only promotes friction and heat.

Regardless of the type of motor bearing, the effective film of lubricant is often microscopically thin. Excessive loading can break it down, resulting in metal-to-metal contact and bearing faliure in a matter of seconds. Needless tension in belt or chain drives should be avoided.

Sprung or broken shafts, burned-out bearings, or overload failure are examples of motor damage commonly caused by misalignment. This can occur in drive or driven machine, for when these elements are assembled in incorrect geometry, bending, breaking or excessive wear results.

Nor is the trouble necessarily caused by improper original installation of equipment. Settlement of foundations, heavy floor loading or excessive bearing wear can all throw alignment out of kilter. Even though a motor and machine may be mounted on a common, rigid base, misalignment may occur. The base itself may have been mounted off-level, leading to a warp in its structure. Where spur gears are used in the drive, the tendency of these gears to push apart may disturb alignment in time. Obviously, alignment must be maintained if motors are to be maintained.

Misalignment sometimes gives a warning. Excessive temperature may warn that it is causing bearing overload or motor overload. Increased vibration may be the warning signal. Or a rapid knocking may indicate that a shoulder of the shaft is being driven against the end of a bearing.

If the installation is not too heavy, it may be possible to loosen the mounting bolts of the motor or machine and experiment with variations in position while the set is in operation. Changes in degree of noise or vibration will guide your efforts until the set is in line and the symptom disappears.

If a motor is off-level, the condition can be corrected by placing shims under the motor feet until the units are in line.

Locating the Cause of Vibration

Even though alignment is perfect, vibration in the driven machine may be transmitted to the motor causing motor parts and electrical connections to shake loose, metals to crystallize and frictional wear to multiply. To find the source of vibration where alignment is correct, do the following:

(1) Tighten mounting bolts; check the motor for loose parts.

(2) Compare the foundation for solidity with that of non-vibrating motors. Further improvement of conditions leading to vibration may be unnecessary or useless.

(3) Check bearings for looseness. Generally, allow two-thousandths of an inch clearance—plus one-thousandth of an inch for each inch or fraction of an inch of journal diameter.

(4) Disengage the vibrating motor from the driven machine. If the motor operates far more smoothly when disconnected, the machine should be examined for sources of vibration.

(5) If vibration trouble seems to date back to rotor repair, check the rotor for balance—dynamic balance if possible, otherwise static. Capscrew the needed weight to point of unbalance, hooking weights around the part of the motor to relieve pull on screw.

The best running position for the motor rotor is its magnetic center. When starting up, a rotor oscil-

lates to find this center, unless physically prevented from movement. Motors should not be operated with the magnetic center forcing the rotor shaft up against a bearing shoulder. Usually these shoulders can take very little loading without damage.

A motor rotor with sleeve bearings and belted drive should be free to oscillate so that any wear is spread over a wider area and kept more even. If not, a change in alignment may permit the shaft to float back and forth axially.

Overload and Underload

Overload can cause motors to heat up and eventually break down or burn out, even though modern insulations can take a lot of punishment. To safeguard against it, motors are often provided with "overload protection" in the form of thermal elements or fuses. The element should never be more than the recommended value as listed in the national code. As a further safeguard, conditions that trip or blow the overload protection devices, such as obstruction in the drive or driven machine, excessive friction within the motor, or an effort to obtain greater output from the driven machine than the motor is capable of carrying, should be avoided.

Although the penalties are less severe, underloading an induction motor is just as improper as overloading it. First step in correcting a condition of underload causing low power factor is to determine the rated capacity of each induction motor and its actual load.

If a plant has been consistently over-motored, it may be possible to advance most motors, except the largest, to heavier jobs, replacing the smallest motors with even smaller ones of proper capacity.

Minimizing underload is the preventive way of improving power factor. Corrective measures include the increased use of synchronous motors, capacitors and synchronous condensers. Whatever the method, improving power factor in your plant gives you more satisfactory production power and other benefits which accrue directly from the efficient operation of your electric motors.

What about repairing the modern motor? In the unlikely event of an epoxy-encapsulated stator breakdown, chances are you should get a replacement winding from the manufacturer. Vulcanized silicone-rubber-insulated coils can be patched by a very simple process. If coil damage is in an accessible location the repair can be made without removing the coil from the winding. Coil removal is much easier with silicone rubber-insulated coils than with the old fashioned taped and varnished types since they are flexible, even after long aging, and are never varnished and baked in the slots.

A Checklist

Here is a list of things to remember in connection with use of the modern motor:

Do treat it like any other motor—as far as bearings and mechanical parts are concerned.

Do wash away dust and dirt with a low pressure water stream.

Do clean off grimy deposits with detergent and water—or any commercial cleaning solution.

Do watch the motor's nameplate rating for load and temperature limits.

Do not worry about splashing or dripping moisture in the motor area.

Do not worry about dry-out periods for shut down motors.

Do not varnish silicone-rubber coil surfaces. Cording and blocking can be revarnished if necessary.

Do not exceed rated temperature limit just because you feel the insulation can take it.

But! First make sure your motor is a "modern" motor with an adequately protected insulation system such as vulcanized silicone rubber or fully-sealed epoxy encapsulation.

Measuring Fluids in Pounds

A PRACTICAL industrial instrument which directly measures liquid and gas flow in pounds has been announced by General Electric Co., Schenectady, N. Y., and Black, Sivalls and Bryson, Inc., Kansas City, Mo. The simple, low-maintenance device is said to precisely measure the weight of flowing fluids with high accuracy over wide ranges of flow rate, pressure, temperature and density.

The pound is a fundamental fluid measurement unit used by many industries as a basis for figuring costs, regulating blending operations, measuring yields, determining energy or BTU content, or metering bulk loading operations. Commonly used methods of determining fluid flow by mass have first required a measurement of fluid volume. This must be corrected either manually or automatically for such variables as fluid temperature, pressure and density to determine pounds. The manual methods are cumbersome, time consuming and leave room for human error. Automatic correction systems are relatively complex and present maintenance problems.

The new flowmeter requires no in-between calculations and is completely self-contained, weighing about 100 pounds. The flowmeter is compatible with automation, being designed to emit a series of electrical impulses, each representing a given weight of fluid. This signal can be used to operate auxiliary equipment such as remote counter, printers or totalizers.

A marked advantage of the sensing and integrating system of the unit is its ability to operate from an unregulated power supply without affecting meter accuracy. First production units are expected to be available early in 1960.

EDITORIAL

Again the Stockpile

► Market researchers, business consultants, the ubiquitous "trade sources" and even the business paper editor have been attempting to explain the why and wherefore of the recent increases in natural rubber prices. Rising automobile production; Red Chinese purchases; cyclical fluctuations and other factors have been firmly identified, either singly or together, as the moving force(s) behind price moves. One fact does stand out, however. It does not take much to influence the workings of the market.

Within the past several weeks the House Appropriations Committee held hearings at which the General Services Administration requested some $49 million to replace sales from all government stockpiles. HR 7040, a bill subsequently introduced and passed by the House, permits sales from the stockpile but makes no allowance for the replacement of perishables (such as rubber) to the stockpile. If HR 7040 is passed by the Senate and signed by the President, the activities of GSA would be seriously curtailed, both as a buyer and as a seller. Selling from stockpiles and not replacing that which is sold automatically acts to reduce the stockpile—that much is clear. However, Public Law 520 forbids stockpile reductions. So then, where are we?

As soon as the rubber trade heard of HR 7040 (mid-May), rubber prices in New York fell by about 2c a pound. While the legal minds attempt to unsnarl the contradictory (if we understand them correctly) implications of HR 7040 and PL 520, the rubber market reacts, often to the confusion of all. Government officials have indicated that it could not be before July, 1960, that any government rubber could be released to the open market. Other officials have stated publicly that it probably would be two years before natural rubber would be sold from the U.S. stockpile. Notwithstanding these sentiments, the rubber market reacted as though government rubber was now being put on sale.

We have commented previously in these columns that the very existence of the natural rubber stockpile cannot help but bear great influence upon market activity. The stockpile "deals itself in" in any transaction between the buyer and seller. The worth of the stockpile as a national defense insurance policy must be considered by other and more competent persons.

We do feel, however, that the natural rubber stockpile, at least, should not be lumped together with such other commodities which are now being stored by the government—particularly when legislation such as HR 7040 is introduced. The rubber industry is much too important in the over-all scheme of things to be thus handled without its consent. We are certain that there is much to be said for each item in the government stockpile—but we are concerned with rubber. Unhappy handling of legislation affecting rubber is to be deplored. We ask:

- A complete review of the rubber stockpile from the military point of view.
- If the stockpile is too large, then an orderly disposal program should be carefully thought out by all interested parties.
- If the stockpile is too small, then an orderly program should be established to attain the military requirement.

Special Industry Report

A Further Look at Employee Feeding

A cafeteria counter supplementing automatic vending of food has solved a variety of inplant feeding problems for the small to medium plant.

IN THE years since vending machines have become important to inplant feeding (see RUBBER AGE, June, 1958), the bloom has largely faded from the rose, and management is taking a hard second look. The main reason for this reappraisal is that experience has proved that as soon as the novelty of using the machines wears off, patronage often declines. Employees regret the loss of some of the pleasant routine and personal service they associate with dining.

But management has discovered that in many instances vending machines offer too many cost advantages to be discarded. They occupy a minimum of valuable floor space, and they eliminate the expense of labor, special plumbing, utilities, dishwashing and food preparation and serving equipment.

With no personnel needed to attend them during slack hours, vending machines perform without extra labor expense in plants with multiple shifts. In addition, they can provide hot food and snacks economically in plants not big enough to support an unsubsidized cafeteria. It is generally considered that at least 700 employees are necessary before a cafeteria can operate without subsidy.

Here is how three businesses whose plants have problems which parallel those of plants in the rubber industry have solved their inplant feeding problems by combining vending machines with a simplified cafeteria.

The Psychological Factor

One manufacturing firm with 1,000 employees in its New York headquarters opened a fully automatic vending machine cafeteria in 1955 so handsomely designed and decorated that *Architectural Forum* featured the room as a model installation. Employee reaction was immediately enthusiastic. About 600 employees regularly patronized the cafeteria, spending all of their hour lunch periods there to eat, talk, play cards and read. This is excellent patronage for the center of New York City.

By 1957, however, the firm requested that four of eleven food machines be removed and replaced with a serving counter and two attendants. The reasons were largely psychological. Many people felt a need for more graciousness in their food service and were dissatisfied by the impersonality inherent in automatic vending machines.

Those replaced were the coffee, pastry, sandwich, tea and hot chocolate machines. These items are now available at the counter with several additional offerings: hot canned dishes, a large variety of main-dish salads and fancy pastries and desserts.

All service is on paper plates and cups, to eliminate need for expensive plumbing and dishwashing equipment, and little additional space is required. Patronage has increased one-third.

Round the Clock Feeding

Another organization faced a particularly difficult feeding problem which is common in many rubber plants. With 1,600 employees and many departments on round-the-clock shifts, reliable feeding service 24 hours a day for lunch periods and breaks was needed.

A cross-industry look at inplant feeding—

A cross-industry survey recently completed by the U.S. Department of Agriculture of more than 6000 inplant locations shows that:

- **Food service is available in 70% of plants with 1,000 or more employees, in 60% of plants with 500 to 999 employees, and in 40% of those with 250 to 499.**
- **The trend is toward providing food service, with newer plants more likely to have it than older ones.**
- **About two-thirds of company food services are contract-operated by outside catering firms.**
- **Contract operation is becoming more popular—for every change from contract to company operation, there were three from company to contract operation.**
- **Direct subsidies were more common in company operations than for contract jobs, although indirect subsidies were generally given to both.**
- **More than one-third (37%) of plants serve one meal a day, 28% serve two, and 35% three or more. Almost half serve breakfast, and 40% serve dinner.**

Thirteen vending machines, most of them placed in special niches in the walls, are located next to a service counter. Machines serve five pastries, six hot food dishes, three kinds of milk, three juices, twenty-four desserts, plus hot coffee, soft drinks, ice-cream, candy, cookies and cigarettes. The counter serves hot dogs, hamburgers, and cheese sandwiches.

Hostesses in this particular set-up were an integral part of the original plan to provide the human element missing from a fully automatic cafeteria (the service counter was added later to give a greater variety of hot sandwiches). Hostesses are on duty from 9 a.m. to 2 a.m. every weekday. A serviceman is there from 7 a.m. to 4 p.m. on week days and half a day on Saturday. Each machine is serviced at least once a day. Sandwich and pastry dispensers sometimes require servicing twice a day.

A vending operator furnishes food, personnel, condiments and paper plates. The firm supplies the facilities, water and electricity. Commissions go to the company's credit union and are returned to employees as dividends.

Eight other vending machines are installed in the building for between-meal snacks. Six in the main working area (two coffee, one soft drink, one candy, one milk and one ice cream) and two in the mailroom (one soft drink and one ice cream) help maintain employee morale and efficiency.

Patronage is excellent, averaging better than 67 per cent of the personnel. "Round-the-clock traffic checks convince us more than ever that we have found the right answer," says a leading executive of the firm.

Room to Grow

Another plant, a new installation in a small town, has approached its feeding problem from still another angle, and its food service cafeteria is now patronized by 80 per cent of its 1500 employees. The problem here was a familiar one. The company needed facilities designed to grow in stages with the anticipated growth of employment at the new plant, which at the start had only 600 people. It had to be large enough to serve present employees, fast enough to permit all workers to eat during their half-hour lunch periods, and expanded as future employees were added. The result, developed in cooperation with the G. B. Macke Corp. in Washington, D. C., is a model installation.

As a first stage, 21 vending machines were placed in the 250-seat dining area to provide a full line, fully automatic cafeteria. Incorporated into the original plans was room for a 21-foot service counter with steam tables, sinks, refrigerator, warmers and grills.

No vending machines were eliminated when the service counter was actually installed, and workers in a hurry still can get a full meal automatically. If they want greater variety, the service counter serves 9 to 10 patrons a minute. Similarly successful installations have been made recently at another of the company's plants. In each case, whether the attended service counter was incorporated into the original plans or added later, all service is on paper plates to eliminate dishwashing and sanitation problems.

Opinion is by no means unanimous, however, on the need to supplement fully automatic facilities. The RCA Victor Division of Radio Corporation of America in Camden, New Jersey, has been using more than 560 vending machines for 8 years and plans to make no changes or refinements, according to Martin O'Shaughnessy, manager of the Food Service Division.

About 6,000 to 8,000 employees of the company rely on the vending machines, either as a supplement to bag lunches brought from home (approximately 75%) or for their complete lunch (approximately 25%). The vending machine habit is so strong that during the recession in 1958, with many men on a shorter work week, vending sales remained nearly stable.

The Problems Vary

No hard and fast rules can be made on the need for a human touch to supplement fully automatic cafeterias. The problem in each plant will be different, depending on such things as the average pay scale, whether employees are men or women, the type of work, and the length of the lunch period. However, experience in recent years shows:

(1) Virtually all employees want greater variety of food as their pay increases.

(2) Half-hour lunch periods encourage fully automatic cafeterias by putting a premium on speed.

(3) Older workers tend to miss the human element more than younger ones.

(4) With more plants in every industry offering inplant food service, the cafeteria has become an important factor in attracting good employees and keeping them happy.

630 Members and Guests Participate in Varied Program at

Rubber Division Spring Meeting

► Approximately 630 members and guests of the Division of Rubber Chemistry of the American Chemical Society were registered for the 75th meeting of the organization held on May 13 to 15 at the Biltmore Hotel in Los Angeles, Calif. The three-day meeting featured the presentation of 37 technical papers, a luncheon meeting of the 25-Year Club, a business session, the Divisional banquet, and special plant trips. In addition, a program was provided for the ladies.

The technical program for the meeting was divided into five sessions, with concurrent sessions held on Wednesday afternoon, May 13, and Friday morning, May 15. The papers ran the usual gamut of rubber chemistry and technology, including data on a new synthetic rubber that will withstand the searing temperatures and corrosive chemicals encountered in missile flights, a new rubber fiber that remains elastic at arctic temperatures, an asbestos-rubber compound that insulates the blast of a rocket engine, improvements in molecular sieves, and a new urethane rubber with considerable resistance to abrasion.

Of the two concurrent sessions held on Wednesday afternoon, May 13, one was a symposium on "Urethane Foams and Elastomers" and the other was the first portion, consisting of contributed papers, of a symposium on the "Effect of Ozone on Rubber." The former, held in the Biltmore Hotel, was presided over by G. T. Gmitter (General Tire). The latter, held in the auditorium of the Southern California Edison Building, was presided over by W. J. Sparks (Esso Research), chairman-elect of the Division. Although eight papers were scheduled for this portion of the ozone symposium, only seven were presented. The paper on "Accelerated Aging Tests and Outdoor Performance of Butyl Rubber" was withdrawn. The session at the Biltmore Hotel was prefaced by a few introductory remarks by Emil H. Krismann (DuPont), Division chairman.

The symposium on "Effect of Ozone on Rubber" was continued on Thursday morning, May 14, with H. A. Winkelmann (Dryden Rubber) presiding. This portion of the symposium consisted of six invited papers, a practice initiated some time ago by the Rubber Division. No sessions were held on Thursday afternoon, permitting members and guests to visit various plants in the Los Angeles area by prearrangement. These included the plants of Douglas Aircraft, Lockheed Aircraft, and Shell Chemical.

The technical sessions were resumed on Friday morning, May 15, with concurrent sessions again being held. The papers at these sessions were of a general nature, and the respective presiding chairmen were B. R. Snyder (R. T. Vanderbilt) and A. J. Hawkins, Jr. (DuPont), the co-chairmen of the

Authors who contributed papers to the symposium on ozone effects included (left to right): F. B. Smith, G. N. Vacca, B. W. Habek, W. L. Cox and W. J. Sparks. Missing from the photograph are the Messrs. Grossman, Sullivan and Winkelmann.

Local Arrangements Committee. Abstracts of all of the papers presented at the Los Angeles meeting appeared in the May, 1959 issue of RUBBER AGE.

Active Business Session

The Divisional business meeting was held on Thursday morning, May 14, with Mr. Krismann presiding. The first order of business was the usual moment of silence held for those who have passed away since the last meeting of the Division. In this instance they included: R. L. Lasser (Harwick Standard Chemical), John A. Liljegren, T. A. Werkenthin (Bureau of Ships), Franklin H. Springer (Davol Rubber), D. S. Oberto (Pirelli) and Everett R. Lawrence (Spencer Rubber Products).

It was announced that Dr. Fernley H. Banbury had been selected as the Charles Goodyear Medalist for 1959. Dr. Banbury is the inventor of the well-known mixer bearing his name and will present his Goodyear Lecture at the International Rubber Conference which will be held in Washington, D.C., in the fall of this year. (Editor's Note: A comprehensive biography of Dr. Banbury appears elsewhere in this issue).

It was further announced that the "Lecture Book," sponsored by the Rubber Division under the editorship of Maurice Morton (Akron University), will be available early this Fall. The book, a compilation of the best lectures presented at various rubber technology courses sponsored by local rubber groups, will consist of some 600 pages and will sell at $10.00 per copy. All members of the Rubber Division will be entitled to special discounts.

Mr. Krismann also stated that the Executive Committee had decided to hold only one divisional banquet a year, rather than one at each of the Spring and Fall meetings in the past. The present planning calls for a banquet to be held at the Spring meetings, at which time the Charles Goodyear Medal will be awarded. Actual decision to hold a banquet at any time rests with the Executive Committee.

Other actions by the Executive Committee included the election of Mrs. C. C. Davis, widow of the well-known and well-remembered "C.C.", as a lifetime member of the Division and election of the following as Emeritus Members: G. L. Allison, G. B. Brittain, Frederick Marchionna, Seward Byam and C. D. Kennedy.

The Nominating Committee, headed by John M. Ball (Midwest Rubber Reclaiming) as chairman, submitted the following slate of officers for the 1959-60 period: *Chairman*, W. J. Sparks (Esso Research); *Vice-Chairman*, L. M. Baker (General Tire) and W. S. Coe (Naugatuck Chemical); *Secretary*, R. H. Gerke (U. S. Rubber); *Treasurer*, George Popp (Phillips Chemical). In addition, the following were nominated as directors for two-year terms from local rubber group areas:

Connecticut—Harry Gordon (Bond Rubber) and R. T. Zimmerman (R. T. Vanderbilt); *Detroit*—R. H. Snyder (U. S. Rubber) and W. D. Wilson (R. T. Vanderbilt); *Northern California*—W. H. Deis (Marine Magnesium) and N. R. Legge (Shell Development); *Philadelphia*—R. A. Garrett (Armstrong Cork) and J. R. Mills (Goodall Rubber); *Rhode Island*—R. W. Szulik (Acushnet Process) and J. M. Vitale (Crescent Co.); *Southern Ohio*—D. A. Meyer (Dayton Rubber) and H. E. Schweller (Inland Manufacturing); *Southern Rubber Group*—J. M. Bolt (Naugatuck Chemical) and M. Mirsky (Guiberson Corp.); *Washington, D.C.*—P. S. Forsyth (Department of Defense) and A. T. McPherson (Bureau of Standards).

During the business session, Raymond F. Dunbrook (Firestone), a past chairman of the Division, acting as chairman of the jury of award, presented the Best Paper Award to Dr. Roscoe A. Pike, Thomas C. Williams and Frank A. Fekete, all members of the Silicones Division of the Union Carbide Corporation. All three received plaques for the paper on "Cyanosilicone Elastomers—A New Class of Solvent Resistant, High Temperature Rubbers," which was presented at the Division meeting held in Chicago last Fall. The paper was presented by Mr. Williams, and was selected on the basis of its technical importance and the quality of the visual aids and oral presentation.

Meeting of 25-Year Club

The luncheon-meeting of the 25-Year Club, which is always the unofficial start of activities at Division meetings, was attended by approximately 140 members and guests, with Dr. E. G. Partridge (University of Southern California) presiding. After Dr. Partridge welcomed the attendants, a moment of silence was observed for those who have passed on since the last meeting. These included: Frank Springer (Davol Rubber), T. A. Werkenthin (Bureau of Ships), Carl Minnig and H. H. Thompson (Xylos Rubber). Mr. Thompson died just a few days before the meeting convened in Los Angeles and an obituary appears elsewhere in this issue.

Dr. Winkelmann (Dryden Rubber) then performed his usual job of selecting the person in attendance with the longest service in the rubber industry who previously had not received the award for such service made at each meeting of the club. The honors at Los Angeles went to Paul Van Cleef, formerly with Van Cleef Brothers of Chicago, now the Dutch Brand Division of the Johns-Manville Corp. Mr. Van Cleef has a record of some 53 or 54 years in the rubber industry.

Paul Van Cleef first entered the rubber industry in late 1905 or early 1906 when he joined the Eugene Arnstein organization. This company made rubber cements and adhesives, largely from rubber secured from Africa and the Amazon region of South America. The rubber was frequently dirty with heavy fragments incorporated and had to be carefully washed and strained before use. A graduate of the University of Chicago, Mr. Van Cleef helped organize Van Cleef Brothers in 1910, and was secretary of that organization at the time it was sold to Johns-Manville a few years ago.

Invited papers to the symposium on ozone effects were delivered by (standing—left to right): W. D. England, G. H. Hunt, J. O. Harris and R. M. Murray; (seated—left to right): M. F. Brunelle, H. A. Winkelmann and M. Lowman.

The symposium on "Urethane Foams and Elastomers" included papers by (left to right): B. F. Frye, R. J. Athey, G. T. Gmitter, S. J. Assony and J. G. Schuhmann. Missing from the photograph is F. Hostettler.

Before closing the luncheon-meeting, Chairman Partridge announced that some 14 new members had joined the ranks and pointed out that all new members, as well as present members, can secure membership pins by writing to Owen Brown of the Cabot organization in Boston, Mass. He also stated that the next meeting of the 25-Year Club would be held during the International Rubber Conference in Washington, D.C., this Fall, with C. A. Bartle (DuPont) presiding as chairman.

Divisional Banquet

The Divisional banquet was held in the evening of May 14 with 630 persons, including 230 women, in attendance. A feature of the evening was a "Champagne Ride" from convention headquarters to the banquet site at the Beverly-Wilshire Hotel in special buses. This combined an opportunity to see points of local interest with a cocktail party made possible through the generosity of a number of suppliers.

E. H. Krismann presided at the banquet. First, he introduced those sitting on the dais which included officers, directors and some members of the Local Arrangements Committee. He then explained to the assembled members and guests the need for the concurrent technical sessions, pointing to the large number of papers which were scheduled for presentation. Concurrent sessions, he stated, also allowed for plant trips.

Mr. Krismann also announced, with regrets, that J. J. White (J. J. White Products) had suffered a heart attack during the meeting and had been admitted to a local hospital. (EDITOR'S NOTE: We are pleased to report that Mr. White has now recovered sufficiently to have been discharged from the hospital.)

The chairman then paid tribute to the Local Arrangements Committee and others in the audience who had worked diligently in arranging for the Los Angeles meeting. He then turned the meeting over to B. R. Snyder, co-chairman of the Local Arrangements Committee who, in turn, introduced the master of ceremonies for the evening. A program of entertainment followed and then members and guests participated in a program of dancing.

Special arrangements were made for the ladies during the meeting. The Ladies' Entertainment Committee arranged for a "get acquainted" tea, a guided tour of Disneyland, a luncheon and a fashion show.

Local Arrangements Committtee

All in attendance at the meeting were in agreement that the arrangements for the meeting were particularly well-handled. The Local Arrangements Committee consisted of the following: *Chairman,* A. J. Hawkins, Jr.; *Co-Chairman,* B. R. Snyder; *Ladies' Entertainment,* C. M. Churchill; *Honorary Member and Consultant,* H. L. Fisher; *Program and Meeting Rooms,* H. R. Fisher; *Banquet,* B. R. Hodowski; *Housing,* C. E. Huxley; *Banquet Ticket Sales,* R. G. Luskin; *Registration,* E. J. Lynch; *Finance,* D. C. Maddy; *Plant Visitations,* E. G. Partridge; *Publicity,* J. L. Ryan.

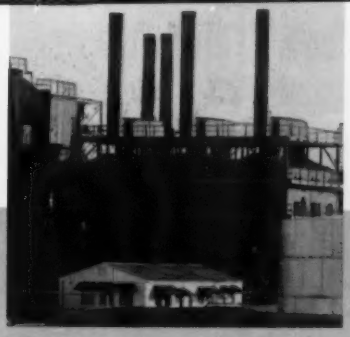
R. F. Dunbrook presents the Best Paper Award to Roscoe A. Pike, Thomas C. Williams and Frank A. Fekete.

Mohawk Files with SEC

►Mohawk Rubber Co., Akron, Ohio, has filed a registration statement with the Securities and Exchange Commission for 15,000 shares of common stock to be offered for public sale through an underwriting group headed by Kidder, Peabody & Co., Inc. The registration statement covered warrants to purchase 6,500 common shares which were sold to Kidder, Peabody last July. Mohawk has arranged with an insurance company to purchase $4,000,000 of its 5.85 per cent notes due in 1974, contingent on the sale of the common shares. The company said that proceeds of the sale will be used to redeem a Mohawk 5.75 per cent note due in 1973. The remainder of proceeds from the sale of the notes and proceeds from the stock sale will be used for purchase of equipment and working capital.

Appoints West Coast Distributor

► National Polychemicals, Inc., Wilmington, Mass., has appointed B. E. Dougherty Co., Los Angeles, Calif., as its West Coast sales agent. Dougherty is a leading distributor of pigments, chemicals, compounding ingredients and other materials and equipment to the West Coast rubber industry. The company will stock and sell National Polychemicals' blowing agents and rubber compounding materials through its offices and warehouses in Los Angeles, San Francisco and Portland, Oregon.



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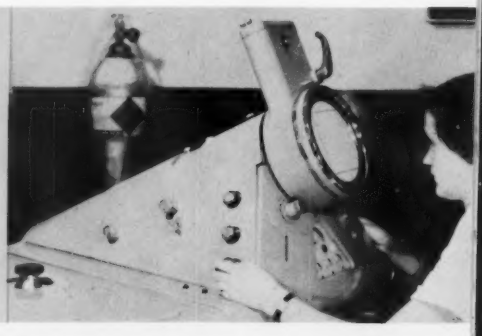

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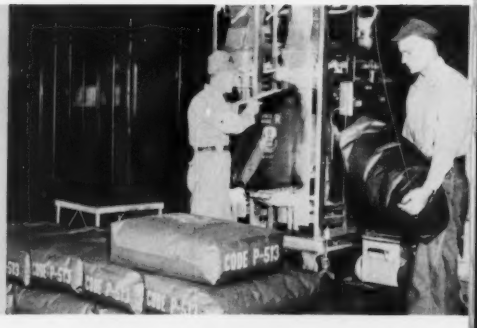
Columbian has pioneered many new methods of precise production control . . . to provide uniformity bag after bag, carload after carload. In addition, Columbian offers a wide range of blacks to match any requirement where rubber with special characteristics is desired . . . a range of blacks that assures superior results in end products.



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For years, Columbian's Technical Service has been considered outstanding in the industry . . . is always available to study any phase of production . . . to contribute workable, practical ideas that can lead to greater economy, efficiency and improved products. Backed by the most modern laboratories and unequalled field experience, Columbian's Technical Service is a potent reason for specifying Columbian carbon blacks!

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Seiberling and General Tire Sign Pacts with URW

► Seiberling Rubber Co. and the General Tire and Rubber Co., Akron, Ohio, have signed new contracts with the United Rubber Workers. The new pacts are similar to that of the URW and the Goodyear Tire and Rubber Co., the only major firm out of the "big four" which averted a strike. The Seiberling agreement covers about 1,500 hourly employees in the company's Barberton and Carey, Ohio, plants. The agreement includes a new master contract, welfare and supplementary unemployments benefits (SUB) programs. The welfare and SUB programs follow a pattern established by Goodyear Tire & Rubber Co.-URW contract signed earlier.

The main features of the agreement are liberalized pension and insurance programs. Normal pensions will be paid now on the basis of $2.40 per month for each year of service before January 1, 1959, and $2.50 per month for each year of service after January 1, 1959. Previously, pension benefits were accumulated at a lower rate and a formula linked to social security benefits was used. Retired employees on pension since 1950 will receive increases to provide benefits of $2.25 per month or more for each year of service.

Disability Benefits

The agreement also offers improved disability and early retirement benefits. A worker is now eligible for normal retirement after 10 years of service at age 65. Early retirement is now possible for employees with 20 years of service at age 55. New insurance provisions include extension of medical coverage and upward adjustments in some surgical allowances. The master contract features a number of changes in the working agreement, including liberalized funeral pay provisions and methods of computing holiday pay. Seiberling and URW also made an agreement to negotiate a skilled trade program.

Changes were made in the SUB program to clarify earlier agreements on the basis of experience in operating the program. The new pension and insurance agreement runs through April 30, 1964, and the new master and SUB contracts run until May 1, 1961.

The General Tire-URW agreement calls for a new labor contract and fringe benefit plans, including pensions. The agreement covers about 3,200 workers in General Tire plants in Akron, and Waco, Texas. The agreement averted a threatened strike, and General Tire became the fourth rubber firm to settle with the union.

The agreement includes a long list of fringe benefit improvements, generally in line with settlements reached earlier between URW and two major rubber firms, Goodyear and U. S. Rubber. General Tire's new pension agreement sets up two methods for computing the amount of a pension. One calls for pensions based on $2.25 a month for each year of service prior to January 1, 1959, and $2.30 a month for each future year of service. The agreement removes a previous limit of 30 years service in figuring pensions. Under the old contract pensions were based on $1.80 per month for each year of service.

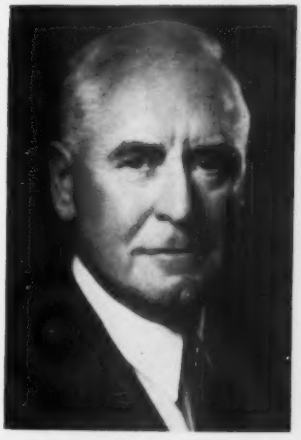
Alternate Pension Method

Under an alternative method the new contract provides pensions on the basis of 1 per cent of earnings for years of service prior to 1949 based on the average annual earnings for the past 10 years. However, under this method, one half of an employee's primary social security benefits are deducted from the total amount he would receive. The employee has the option of using the plan that would give him as an individual, the larger pension.

Meanwhile, strikes of 32,000 URW members against Firestone Tire & Rubber Co. and B. F. Goodrich Co., plants continue (at this writing) with no indication of a speedy settlement of the strikes which began on April 16. Goodrich negotiators have been meeting with URW officials at Canton, Ohio, while negotiations between the rubber workers' union and the Firestone Tire & Rubber Co. are now in progress in Cleveland, Ohio.

Banbury Named 1959 Goodyear Medalist

► Dr. Fernley H. Banbury, inventor of the Banbury mixer—a machine used by all the major rubber companies and by manufacturers of plastic products, linoleum, cellulose acetate and asphalt compounds—has been named winner of the 1959 Charles Goodyear Medal, the highest honor in rubber chemistry. The announcement was made at the 75th meeting of the Division of Rubber Chemistry by Dr. R. F. Dunbrook, assistant director of research of the Firestone Tire & Rubber Co., chairman of the jury of award.



Dr. Fernley H. Banbury

The gold medal, given annually by the Division for contributions to rubber chemistry, will be presented to Dr. Banbury at the International Rubber Conference to be held in Washington, D. C., in November. The award was established in honor of the discovery of the vulcanization process by Charles Goodyear in 1839.

Dr. Banbury was born in Cornwall, England, in 1881. He was employed in a foundry and machine shop and as a draftsman for an engineering firm, and attended Plymouth Technical School and the Camborne and Penzance School of Mines at Cornwall.

The Medalist came to the United States at the age of 22 and enrolled at Purdue University, where he received a B.S. degree in electrical engineering in 1906. He studied at the Lewis Institute in Chicago and was employed by the Commonwealth Edison Co. and their engineering firm, Sargent & Lundy. For five years he worked with Dr. Edward A. Acheson, inventor of carborundum, in this country and in Europe. He then became sales engineer for the Werner and Pfleiderer Co.

In 1916, Dr. Banbury, with the patent for his now famous mixer, joined the Birmingham Iron Foundry in Derby, Conn. He later became manager of the Banbury Mixer Department of the Farrel-Birmingham Co. Retiring in 1943, Dr. Banbury continued his association with the company as a consultant until 1951. Dr. Banbury received a Modern Pioneer Award from the National Association of Manufacturers in 1940. In 1948, Purdue University awarded him the honorary degree of doctor of engineering. Dr. Banbury lives at Laguna Beach, Calif. in the winter, and at Clearwater, Florida, in the summer. He is a member of the Los Angeles Rubber Group.

International Latex Opens Synthetic Latex Laboratory

► Chemical Division of the International Latex Corp., Dover, Del., has begun operations at a newly constructed laboratory for the development of synthetic latices tailored for various industrial applications. The goal of the new laboratory is to hasten development of latices and to bring to the surface thousands of latex polymers that may be used to solve industrial problems.

The latex laboratory employs more than 50 researchers and provides them with the best possible facilities. Under the direction of Dr. Verle Miller, they are organized in groups to approach problems of latex applications in carpets, paints, non-woven fabrics, paper, foam rubber, dipped goods, textiles and adhesives. Each group, which consists of men with experience in the consuming industry as well as in polymerization, has an area of the laboratory which is equipped with the special apparatus needed for research in its particular field.

When presented with a customer problem, laboratory personnel will first screen its present line to see if it has a product which meets all requirements. If not, the appropriate team of researchers will undertake development of a modified material or formulation of a new product. Critical components of the system will be varied until promising results are achieved.

Three large bottle polymerizers, each able to handle 32 different polymerizations at a time, are available for making experimental samples. An electron microscope is used to determine latex particle size. The particle size range in latices, as in other polymers, has an important effect on the properties. As research men are able to determine the nature of each problem, they can work out a problem methodically rather than by simple trial and error.

Around the central compounding area, adjacent to a specially equipped polymerization laboratory, are arranged a paint laboratory, an adhesives laboratory, a paper laboratory, a dipped goods laboratory, a textile laboratory and a non-woven fabrics laboratory, each equipped for the full ranged of testing employed by its industry. ILC is prepared to duplicate any test a customer would do himself.

A non-woven fabric producing unit is duplicated in the textile laboratory.

Often used as a saturant for paper in specialized applications, latex is experimentally added to the beater in the initial stage of paper making.

The paper laboratory contains a Valley Iron pulp beater and a Noble and Wood sheet making machine and all of the standard paper testing apparatus. For studying latex applications in textiles, there is a sample card for making non-woven fabrics. This produces random oriented webs that may be used to evaluate latices intended as binders for non-woven fabrics.

There are two constant temperature and humidity testing rooms, one operated at standard conditions for testing rubber and textiles, the other for paper. An ozone chamber accelerates aging to test the longevity of new latices under either static or dynamic conditions. Heat, another aging factor in rubber, is provided by a large variety of ovens. There is also an aging block for heat aging samples under isolated conditions.

Elsewhere, there is a fadeometer, U. V. exposure equipment, gas fading apparatus, hardness testers, tensile strength testers, adhesion and mar testers, impact testers, scrub testers, stiffness testers, tear testers, burst testers and abrasion testers.

Products which pass tests in the laboratory are moved to production via a pilot plant to make sure that properties will be retained when made in larger equipment. Its facilities were designed to be versatile and applicable to a large number of systems. Included are two 5 gallon reactors with a 10 gallon stripper, and scale-up 100 and 200 gallon reactors with a 500 gallon stripper. All vessels have variable speed agitation. As in the plant itself, equipment is glass lined or composed of stainless steel for easy cleaning. Production can be changed from one polymer to another quickly without fear of contamination.

Beyond the detailed problems brought in by customers, the new laboratory will be utilized to work toward some long range latex research goals. The aim of the company is to increase the value of latex in each consuming field.

NEMA Convention

► The Wire and Cable Section of the National Electrical Manufacturers Association held its annual spring convention on April 27-29, at the Westchester Country Club, Westchester, N. Y. Highlights of the three-day "work and play" convention included an address by C. A. Kirkpatrick, professor of marketing at the University of North Carolina; discussions of trends in the wire and cable industry; reports of Section Committees; and an inter-industry relations program featuring top speakers from a leading utility company and electrical league, National Industry Conference Boards and from two national trade associations.

New Hypalon Polymer Announced by Dupont

► A new chlorosulfonated polyethylene polymer, designated "Hypalon 40" synthetic rubber, has been announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The new rubber is said to offer greatly improved processability over other Hypalon types and many conventional elastomers, producing vulcanizates which exhibit outstanding physical and chemical properties.

These improvements have been gained without sacrificing desirable qualities which characterize other Hypalon polymers, such as resistance to deterioration by oxygen, ozone, heat and weathering, and outstanding colorability and color retention, the company states. The new rubber is said to offer "complete" resistance to ozone. However, because of its high solution viscosity, Hypalon 40 is not applicable to solution applications.

The excellent processing characteristics of the rubber are said to give greatly improved processing mobility. It quickly bands and softens to a smooth sheet on a mill and rapidly accepts and disperses compounding ingredients. Mixing time, based on laboratory tests, is said to be 30 to 40 per cent less than for other Hypalon polymers. It is also applicable to slow, medium or high speed Banbury mixing and releases easily and discharges at temperatures which are 10° to 50°F. lower than conventional elastomers.

The high hot strength, release and smoothness characteristics make the rubber ideally suited for calendering at various gauges and temperatures. In one plant on a 60-inch calender, it was found practical to produce a two-mil film which could be removed by one man, without distortion or tearing.

Hypalon 40 produces extrusions which are low in die swell, smooth at fast extrusion rates, collapse resistant, and sharply defined, especially at thin edges, according to company representatives. These advantages are realized in both gum and highly loaded formulations. The improved hot tear strength of cured Hypalon 40 and its higher uncured viscosity work to advantage in the preparation of molded items. Better tear strength and ultimate elongation at curing temperatures facilitate the removal of products from intricate molds or inserts.

Fewer cross-linking sites and low nerve give compounds which tend to build up less heat during mastication, thus providing compositions which are essentially scorch-free. Other desirable assets are improved processing life and bin storage life.

Vulcanizates are claimed to exhibit outstanding physical and chemical properties. For example, they combine excellent oil resistance with high heat resistance. These properties, plus excellent compression set resistance, tensile and tear strength, elongation, and abrasion resistance, make Hypalon 40 useful for high temperature service. In addition, the polymer has flame and oil resistance comparable to neoprene, company officials state.

The most extensive field testing program ever undertaken by the elastomer testing laboratory of DuPont has produced excellent results. Thirteen different companies making hose, molded goods, wire and cable, industrial rolls, coated fabrics, and complex industrial extrusions, have employed the polymer in trials with uniformly good results, not only in processability but also in characteristics of the final product. The rubber sells at $.70 per pound.

Properties of "Hypalon 40" are said to give outstanding results in calendering. In one plant, two-mil film was removed from 60-inch calender by one man without distortion or tearing. The photograph shows the clarity of the film.

United Engineering Appointments

► United Engineering and Foundry Co., Pittsburgh, Penna., has appointed K. C. Gardner, Jr., as treasurer, a position he will hold together with his present position as executive vice-president. Mr. Gardner succeeds George V. Lang, who is retiring after 50 years of service. Mr. Lang will continue with the company as a consultant on financial matters. Charles W. Rebhun, former assistant secretary, has been elected to the newly created position of controller, while N. J. Chavern, manager of payrolls and pensions, has been named assistant secretary. All other officers were re-elected to their existing official positions, the company announced.

Named Senior Sales Engineer

► Goodyear Tire & Rubber Co., Akron, Ohio, has appointed John Platner to the post of senior sales engineer in charge of rubber chemicals for the Rubber and Rubber Chemicals Department of the company's Chemical Division. Mr. Platner was graduated from Heidelberg College in 1947 with a degree in chemistry and joined Goodyear the same year. After a period of training he was assigned to the Research Division. In 1953 he was assigned to the Coatings Department of the Chemical Division, remaining in this post until his present appointment. He received an M.S. degree in chemistry from the University of Akron in 1954.

Finley Named Manager

► B. F. Goodrich Co., Akron, Ohio, has named Laurence H. Finley as operating manager for its Purchasing Division with headquarters in Akron. Mr. Finley, formerly purchasing agent at the firm's Los Angeles plant, succeeds A. D. McPherson who retired on January 1. Mr. Finley attended Ohio State University and the University of Akron, and joined Goodrich in 1943 in the physical testing laboratory. Following service with the U. S. Navy, he took part in a purchasing training program and in 1948 he was named purchasing agent of the Goodrich plant in Tuscaloosa, Ala. He transferred to the Los Angeles plant in 1953. Mr. Finley is a member of the NAPA.

Detroit Group Meeting Features Sessions on High Performance Tires

► Two sessions on high performance tires were the feature of the April 17 meeting of the Detroit Rubber and Plastics Group at the Detroit Leland Hotel, Detroit, Mich. There were 135 members and guests present. The pre-dinner panel discussion on technical problems associated with high performance tires was moderated by R. W. Smith (B. F. Goodrich Tire). Mr. Smith defined "high performance" for purposes of the panel's discussion as tires having the capability to operate at high speeds. He pointed out that in other characteristics—such as ride, flat spotting, traction, and tread wear—such tires are likely not to be quite so satisfactory as the original equipment 100-level tire.

Compounding Problems

K. W. Brandau (Firestone) discussed the compounding problems associated with high speed tires. Mr. Brandau stated that high speed passenger car tires normally fail from tread cracking. He presented interesting data relating frequency and severity of tread cracking to a qualitative "dispersion rating." The evidence clearly established the importance of proper carbon black dispersion in minimizing tread cracking failures. The importance of state of cure of the tread was also emphasized by Mr. Brandau. Data was shown on the value of an internal-cooling type cure in minimizing tread overcure that might result in the normal hot type cure cycle. The higher temperatures at which high speed tires operate often cause severe aging of body stocks with resultant tread separation, according to Mr. Brandau. As a result, body stocks with superior aging properties and lower running temperatures must be used in high speed tires.

The problem of racing tires for use at speeds up to 170 mph on banked tracks and 250 mph on straightaway runs requires even more stringent measures Natural rubber stocks are used exclusively to insure lowest heat build-up. Tread stocks are compounded as hard as 85 durometer to decrease the flexing of the rubber which is responsible for heat build-up. Hard treads also give greater stability to the tire so that turns can be made with a minimum of slippage. In contrast with high speed passenger tires, tread-cracking is not a serious problem with racing tires. Tread pattern, tire construction, and high inflation pressures combine to prevent much movement of the tread ribs in use, Mr. Brandau stated.

Dr. E. H. Wallace (U. S. Rubber) discussed design variables which affect high speed performance of passenger car tires. Dr. Wallace pointed out that safety at high speed is the major consideration in high performance tires today. Even though the average driver hesitates to travel at speeds greater than 65 mph, he feels much more secure on tires which have been proved at 95 or 100 mph. According to Dr. Wallace, standard laboratory wheel tests indicate that a passenger car tire can absorb about 10 horsepower and run continuously. Greater power consumption by the tire will cause rapid failure, the speaker stated.

Design objectives for high speed tires are aimed at keeping power consumption by the tire at a safe level at maximum design speed. The most important design variables in achieving these objectives are tread weight, cord crown angle, and inflation pressure. Reduction of tread weight from 17.0 pounds to 9.5 pounds results in power consumption by the tire from about 23 HP to about 9 HP at 100 mph. These tests were run on 8:20-15/4 tires operating at 27 psi inflation and 0.75 inch deflection. Tests of the effect of finished crown angle of cords were run on 7:60-15 tires inflated to 26 psi and loaded to 0.40 inch deflection. Data from these tests showed that a reduction in crown angle from 31° to 25° reduces power consumption by the tire from about 13 HP to about 9 HP at 100 mph. The effect of inflation pressure is less pronounced. Increasing inflation from 24 psi to 35 psi reduces power consumption by about 4 HP; the increment from 30 psi to 35 psi cuts power consumption by only 1 psi. The combined effects of low cord angle and reduced tread weight were discussed for 7:60-15/4 tires operating at 26 psi inflation and 1200 pound load. The standard tire (crown angle 38.5°; weight of tread region—16 lb.) absorbed nearly 20 HP at 100 mph, while the experimental tire (crown angle 30°; weight of tread region—10 lb.) only absorbed about 8.5 HP at the same speed.

Cites Tread Design

Dr. Wallace also discussed differences in tread design which are desirable for high speed service. The high speed design normally has fewer ribs which permits wider elements for greater stability and handling. The design is not broken up as much in high speed tire treads, and interconnecting of tread grooves is avoided. The latter feature minimizes the number of points where initiation of undercutting and tearing of tread elements may take place. However, Dr. Wallace pointed out when the slots in the tread do not connect with the grooves, there is a reduction in skid and traction performance of the design.

Discusses Test Methods

Test methods for evaluating high performance tires were discussed by E. E. McMannis (Goodyear). He said that one common method of evaluation is to photograph the tire as it is run on a test wheel at various conditions of load, speed, and inflation. The distance from the axle center to the maximum and minimum points on the traction wave is determined to obtain a measure of the initial amplitude of the distortion wave. Data was shown on the relative amplitudes of the wave under different conditions of speed and inflation. The effect of tread weight on the amplitude of the traction wave was also shown. Results by this technique confirmed Dr. Wallace's studies in horsepower consumption — indicating that lower tread weights and higher inflation pressures both increase the high speed capability of a tire. The use of probe thermocouples for evaluating relative performance under different operating conditions was also discussed by Mr. McMannis. He showed data indicating that a high performance tire reaches the same operating temperature as a 100-level tire at 25-30 mph higher speed. Handling characteristics of high performance tires are also determined by Goodyear, according to Mr. McMannis. On a specially designed cornering machine, steering angle can be varied so that differences in slip angles, self-aligning torque, and cornering forces can be measured. Tests show that the cornering force for high performance tires are greater than for a typical 100-level tire.

In addition to laboratory tests, Mr. McMannis reported that Goodyear uses turnpike tests and a circular test track for evaluating high performance tires. The test track is designed with a parabolic contour which permits running at speeds from 80 to 140 mph without side thrust.

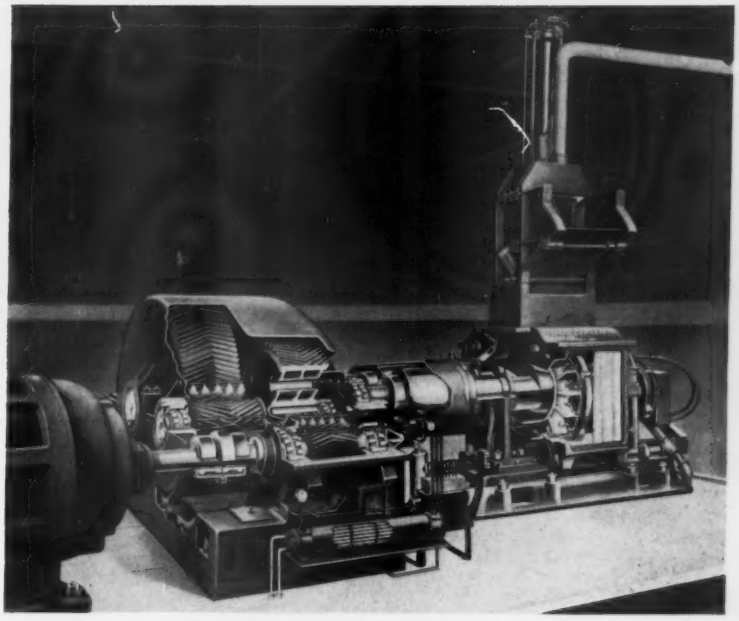
In the after-dinner session, those in attendance were treated to color movies of a number of well-known road and track races in the United States and Europe. Master of ceremonies for the post-dinner meeting was M. G. Brush, (Firestone). Movies included scenes from Daytona, Indianapolis, Darlington, Monza, Bonneville, and Pike's Peak. In addition, Mr. Brush had typical tires on display illustrating the difference in construction and compounding of the tires used under different racing conditions.

Flintkote Subsidiary to License Dasher Process

► Flintkote Co., New York, N. Y., has introduced what is said to be a new, more economical dewatering process for the manufacture of both natural and synthetic rubber, which is now available for licensing through the company's subsidiary, the Patent and Licensing Corp. The new process, invented by rubber researcher, Dr. Paul Dasher, is said to mark the first time that raw rubber can be mixed and dried in one operation. Utilizing a special Farrel-Birmingham Banbury mixer, the process eliminates the need for costly drying and cleaning equipment and increases the volume of rubber production, Flintkote states.

The rubber industry has long sought a process to curb the costly drying of raw rubber. At present, in the manufacture of synthetic and natural rubber, the raw material is precipitated from a latex, which contains a great amount of water. After preliminary pressing, approximately 20 per cent of the remaining water content is removed via steam or air drying in a continuous conveyor oven.

This method, currently used by rubber manufacturers, is said to have distinct disadvantages. Particles of raw rubber invariably dry on the outside first and this dry exterior is then penetrated by water seepage from the wet interior. The rubber is also exposed to a high amount volume of air which tends to deteriorate the rubber product. Other problems involved in the present method are those of equipment cleaning, down time, and the fact that very fine particles of rubber cannot be dried on a porous screen.



Cutaway view of No. 11 Banbury mixer, with Uni-drive for standard or high horsepower mixing, which is utilized in the new Flintkote dewatering process.

Drying Process Explained

Drying is accomplished in the new P & L licensed process, on a special Farrel-Birmingham Banbury Mixer by applying an intense shearing action to the raw rubber, thus causing an internal heating above the boiling point of water, which then flashes off as steam. Separate or preliminary pressing is eliminated because the Banbury assumes this part of the operation, company officials point out.

The new process permits simultaneous batching of carbon black, silicates, whitings, oils and other additives and will dry settling tank precipitates which are not easily dried by other methods. According to the company, it has proved highly successful in mixing and drying synthetic type rubbers such as standard butadiene, polybutadiene and acrylonitrile. The process also makes it possible to control to a large measure, the variations in the processability of the rubber (the Mooney).

During the last five years, through intensive research and actual commercial operation, Dr. Dasher successfully produced and dried 12,000,000 pounds of many types of rubber, including some of the more difficult synthetic types, via the new Banbury 3A mixing process. It is believed that the Banbury No. 11, a much larger version of the 3A, should be capable of increasing this output from 6,000 to 12,000 pounds per hour of dry product.

The Dasher Process is licensed under a group of U. S. patents controlled and issued to the Patent and Licensing Corp., in September, 1958. One major rubber manufacturer is currently utilizing the new process on an experimental basis with a No. 11 Banbury. Within the next five years, over-all industry use of the new process is envisioned and it is believed that this will result in savings of at least $5 to $10 per ton in the manufacture of synthetic rubber.

Staley and UBS Plan Merger

► A. E. Staley Manufacturing Co., Decatur, Ill., and UBS Chemical Corp., Cambridge, Mass., have agreed on a merger of UBS into Staley on the basis of the exchange of one share of common stock of Staley for each one and three-quarter shares of common stock of UBS. The preferred stock of UBS is to be retired prior to the merger. The merger will require the issuance of approximately 102,000 shares of Staley common presently authorized but not outstanding. Consummation of the merger is contemplated for this summer and is subject to approval of the stockholders of both companies and to completion of legal and other studies now underway.

Triangle Conduit Buys Plant

► Triangle Conduit & Cable Co., Inc., New Brunswick, N. J., has purchased a plant in Landisville, N. J., for about $700,000. The company has announced that it plans to use the plant to produce bituminized fiber and conduit.

Nylon Recovery Process

► Recovery of nylon from discarded automobile tire carcasses through a simple chemical process has been announced by the U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y. According to the company, the recovery system, called "ADL," removes all contaminents from the nylon. Mechanical properties of the recovered nylon are substantially equivalent, in most respects, to the virgin variety for such purposes as molding, the company states. A company spokesman reports that the increasing usage of nylon in tires meant that the nylon, which had been considered a waste product of its unique patented rubber reclaiming process, had important possibilities as a by-product, and accordingly, the firm sought an economic method of utilizing nylon fiber. An eight-month crash program by the Product Development Section of Arthur D. Little, Inc., Cambridge, Mass., research and engineering consultants, led to the process which recovers and purifies the nylon, the company states.

Philadelphia Group Hears Panel Discussion on Sponge

► Over 175 members attended a panel discussion on "Sponge" held by the Philadelphia Rubber Group on May 1, at the Poor Richard Club, Philadelphia, Penna. Dr. Derek Angiers (American Foam Products) served as panel moderator and began the proceedings with some brief remarks about the terms "Sponge", "Foam" and "Expanded Rubber". He stated that the panel discussion will be about man-made foams, and explained that foams have been made from numerous latices, such as natural, GRS, combinations of both, neoprene and acrylonitrile rubber. Dr. Angiers pointed out that to those directly concerned with the foam industry, the biggest controversy is between flexible urethane and latex foam. He emphasized that this so-called "war" may ultimately benefit both consumer and manufacturer, since the stimulus of competition has lead the seeking and development of better compounds, more efficient production and lower prices.

The first panelist, George R. Sprague (B. F. Goodrich), in discussing "Recent Developments in Expanded Rubber" clarified the term expanded rubber; breaking the field into three groups, foam, sponge and closed cell expanded products. He stated that the recent developments in the production of expanded rubber may be drawn into four categories, which are elastomeric materials, blowing agents, curing systems and filler materials. He discussed developments in each of the categories. He concluded his remarks by stating that the over-all market for expanded open and closed cell rubber and plastics is ever growing and continually presents new challenges to the rubber chemist.

Discusses Foam Sponge

"Latex Foam Sponge" was the title of the talk given by Aaron L. Back (A. L. Back & Associates). In his introductory remarks, Mr. Back stated that the early growth of the latex foam industry was held back by various technical difficulties, the major one being how to ship it. He pointed out that it was necessary to learn how to concentrate the latex from the 30 to 40 per cent solids content as it comes from the tree to the 60-plus per cent solids content needed to make good foam.

In speaking about statistics, he stated that the importance of latex foam is emphasized by the fact that it is the third largest user of natural rubber in the United States, exceeded only by tires and tire products, and by mechanical goods. He explained that in the manufacturing process, most of the latex foam sponge is made by the Dunlop process, and that a considerable tonnage of foam rubber is made also by the Talalay process. He then described both processes and discussed the physical and chemical properties of latex foam sponge, and its uses.

Officers of the Philadelphia Rubber Group and panel members of the Group's May 1 symposium on "Sponge." Left to right: R. S. Graff, group chairman (DuPont); Aaron L. Back (A. L. Back & Associates); George R. Sprague (B. F. Goodrich); Dr. Derek Angiers, panel moderator (American Foam Products); Jack Borsellino (Thiokol); Marty Glickman (U. S. Steel); and H. C. Remsberg, group vice-chairman (Carlisle Tire).

Marty Glickman (U. S. Steel Corp.) spoke on "Urethane Foam in Curtain Wall Construction." He stated that for generations, the construction industry has been tightly bound by the shackles of tradition, habit and archaic building codes. However, modern chemical technology and know-how are largely responsible for the trend from monoliths of masonry to the present day use of curtain wall construction. He explained that present day curtain wall panels can be divided into two classifications: stressed skin panels and framed panels. He pointed out that the stressed skin type of panel includes the true sandwich in which the skins or surface sheets are laminated to a core material.

In recent years, Mr. Glickman continued, the foamed-in-place cellular plastics have emerged as a potential core material. However, before curtain wall panels incorporating these new materials could be considered marketable, criteria had to established. This was undertaken through an intensive research and development program. He then described the various tests made to determine the usability of cellular plastics. The work that has been done, he said, indicates that urethane foam, steel faced panels are a real advance for curtain walls but there are still tests being conducted on new materials that are being offered as cores. The goal is the best possible panel that can be made.

The final panelist, Jack Borsellino (Thiokol), presented his views on "New Products: Urethane Rigid Foams". He stated that we should start thinking about using urethane foam by itself in curtain wall applications. Everyone, he pointed out, is thinking of and encouraging others to use urethane rigid foams as a void filler, but few have created an interest in using a urethane rigid foam *per se*, that is, without substrates such as wood, metal, plastics and other available materials. He projected the potential urethane foam product into the future stating that one application is the use of rigid urethane foams in walls for industrial and residential buildings.

Mr. Borsellino explained that the insulation value of such a wall in any building should satisfy even those who are skeptical of rigid urethane foams. He stated that rigid urethane foams can be used in the manufacture of shipping containers, eliminating paper, wood, etc. He concluded his remarks with the introduction of a new application and use of rigid urethane foam resins: a rigid urethane foam resin system that could be placed on a surface by roller coating or even by a paint brush. In effect, he remarked, it would be possible to apply a pigmented foam of varying geometric design. It is conceivable that this would improve acoustical properties, give a longer wearing surface, and be more pleasing to the eye, he stated. At the conclusion of the talks, Dr. Angiers conducted a lively question-and-answer session.

Scholarship Award

The Philadelphia Rubber Group has awarded its annual scholarship at the University of Akron's Institute of Rubber Research to Frederick R. Ells of Norwalk, Conn., to further advance his study of rubber technology. The scholarship was offered to a full-time graduate student who attended a high school, preparatory school, or college in the states of Pennsylvania, New Jersey, Delaware or Maryland. Mr. Ells received his B.S. degree from Lehigh University. His selection was made by the Scholarship Committee at the University of Akron. Mr. Ells worked for several years as a research chemist for Firestone Tire & Rubber Co., Akron, Ohio, and left that post to devote full time to studying research in the field of polymer chemistry.

Bokanyi

Nelson

Nelson Celebrates Anniversary

► Nelson Employment Service, Akron, Ohio, which specializes in job procurement and personnel recruiting for the rubber industry, celebrates its tenth anniversary this year. Established as a one man operation by Harold Nelson in 1949, the firm now has a staff of twelve and its quarters have been expanded twice. Nelson handles the entire range of rubber industry posts, including those of draftsmen, engineers, chemists, directors of research, vice-presidents and sales or production executives, and operates on a world-wide basis. Lou Bokanyi, a graduate engineer who has had 20 years of engineering experience in the rubber industry, is in charge of technical placement. To keep pace with new developments, both Mr. Nelson and Mr. Bokanyi attend special courses in rubber chemistry at the University of Akron, as well as various rubber group meetings. They have toured many of the rubber manufacturing plants in this country making job studies and getting job descriptions.

Reduces Urethane Prices

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced that the prices of three types of Du-Pont urethane elastomers have been reduced. The new prices, retroactive to May 1, apply to "Adiprene L Urethane Rubber" and two related development products, "LD-167" and "LD-213". Reductions, which range from 33 to 45 cents per pound depending upon package type, are the result of production economies made possible through increased use of the materials, the company said. Prices per pound, f.o.b. Carney's Point, N. J., for all three products are: Carload—55 gallon drums, $1.15; 55 gallon drums (450 pounds) have been reduced from $1.50 to $1.17; 5 gallon pails (40 pounds) have been reduced from $1.75 to $1.30; and the quarts (2 pounds) have been lowered from $2.00 to $1.65.

Resumes Butadiene Production

► Humble Oil & Refining Co., has put its entire butadiene plant at Baytown, Texas, back into operation of a result of greater butadiene demand. The plant, which ceased operations in the spring of 1958, has an annual rated capacity of 65,000 short tons, the company states.

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Financial News

American Brake Shoe

► For 1958: Net income of $4,777,738, which is equal to $2.97, compared with $9,124,438, or $5.67, the year before. Sales last year totaled $137,998,280 compared with $186,851,369 in 1957.

McNeil Machine

► For 1958: Net income of $2,045,965, which is equal to $3.29 per common share, compared with $3,354,363, or $5.55, in 1957. Sales last year totaled $30,878,789, compared with $43,288,000 in the previous year.

New Jersey Zinc

► For 1958: Net income of $798,292, which is equal to 41c a share, compared with $1,227,047, or 63c a share, in 1957. Sales last year totaled $13,096,332, compared with $17,115,659 in the preceding year.

Monsanto Chemical

► For 1958: Net income of $11,339,000, which is equal to 51c per share, compared with $6,066,000, or 27c a share, in the preceding year. Sales last year totaled $149,792,000, compared with $127,475,000 in 1957.

Cooper Tire

► For 1958: Net income of $956,729, which is equal to $3.01 per common share, compared with $263,290, or 97c a share, in the previous year. Sales last year totaled $31,042,481, compared with $24,473,277 the year before.

Morningstar-Paisley

► For 1958: Net income of $550,524, which is equal to $1.11 per share, compared with $483,277, or 98c a share, in the preceding year. Sales last year totaled $23,136,122, compared with $21,813,478 in 1957.

Anaconda Wire

► For 1958: Net income of $1,279,537, which is equal to $1.52 per share, compared with $4,972,094, or $5.89 a share, in the preceding year. Sales last year totaled $101,636,216, compared with $125,602,416 in 1957.

Raybestos-Manhattan

► For 1958: Net income of $1,902,017, which is equal to $3.01 per share, compared with $3,452,240, or $5.47 a share, in 1957. Sales last year totaled $72,260,256.

National Automotive Fibres

► For 1958: Net loss of $382,951, compared with a net income of $1,018,052, or 97c per share, the year before. Sales last year totaled $21,555,243, compared with $47,375,065 in the preceding year.

Triangle Conduit

► For 1958: Net income of $2,556,695, which is equal to $1.88 a share, compared with $3,481,631, or $2.56 a share, in 1957. Sales in 1958 totaled $56,901,106 compared with $56,299,224 in the previous year.

Kleinert (I. B.) Rubber

► For 1958: Net income of $655,400, which is equal to $2.20 per share, compared with $555,877, or $1.87 a share, in 1957. Sales last year totaled $13,423,734, compared with $12,742,147 the year before.

O'Sullivan Rubber

► For 1958: Net income of $125,092, which is equal to 23c per common share, compared with $202,647, or 43c a share, the year before. Sales in 1958 totaled $6,226,326, compared with $6,440,620 in 1957.

DeVilbiss

► For 1958: Net income of $920,744, which is equal to $2.53 per share, compared with $1,556,957, or $4.26 a share, in 1957. Sales last year totaled $28,692,406, compared with $26,000,116 the year before.

Mansfield Tire

► For 1958: Net income of $2,310,588, which is equal to $3.71 per common share, compared with $1,522,957, or $2.50 a share, in the previous year. Sales in 1958 totaled $63,634,393, compared with $59,722,211 in 1957.

Goodall Rubber

► For 1958: Net income of $361,848, which is equal to 75c per common share, compared with $572,002, or $1.20 a share, the year before. Sales in 1958 totaled $10,961,650.

Sheller Manufacturing

► For 1958: Net loss of $304,371, compared with a 1957 net income or $2,050,558, or $2.15 per share, in 1957. Sales in 1958 totaled $30,166,617, compared with $42,139,499 in 1957.

Spencer Chemical

► Nine months ended March 31: Net income of $2,228,585, which is equal to $1.62 per common share, compared with $2,191,807, or $1.58 a share, in the equivalent period of the preceding fiscal year. Sales in the nine months ended March 31 totaled $36,367,640 compared with $30,659,765 in the same period of fiscal 1958. Per share figures were computed after preferred dividend requirements.

Hercules Powder

► Quarter ended March 31: Net income of $4,883,463, which is equal to 57c per common share, compared with $3,294,583, or 38c a share, in the first quarter of 1958. Sales in the first three months of this year totaled $64,174,562, compared with $56,805,235 during the same period last year.

Goodrich

► Three months ended March 31: Net income of $10,324,124, which is equal to $1.15 per common share, compared with $6,289,545, or 70c a share, in the first quarter of 1958. Sales in the 1959 first quarter totaled $195,825,645, compared with $161,926,836 in the equivalent period of the preceding year.

National Rubber Machinery

► Quarter ended March 31: Net income of $54,000, which is equal to 27c per share, compared with a loss of $39,000, in the same period last year. Sales in the 1959 first quarter totaled $2,604,000, compared with $2,193,000 in the 1958 first quarter.

Mohawk Rubber

► Year ended December 31: Net earnings amounted to $1,065,375, equal to $4.75 per share of common stock, compared to $563,180, equal to $2.51 per share for the previous year. Net sales for 1958 totaled $25,513,203.

Pantasote

► For 1958: Net income of $115,505, which is equal to 20c a share, compared with $320,985, or 55c a share, in 1957. Sales last year totaled $5,534,362, compared with $5,556,514 in 1957.

Brown Rubber

► Year ended December 31: Net loss of $1,045,027, compared with a net loss in 1958 of $400,030. Deficits are after tax credits of $345,000 and $425,000, respectively.

Garlock Packing

► For 1958: Net income of $701,543, which is equal to $1.42 per share, compared with $1,643,980, or $3.33 a share, in 1957.

Elmer F. Myers

Farrel Promotes Two

► Farrel-Birmingham Co., Inc., Ansonia, Conn., has appointed Elmer F. Myers as assistant district manager of the Akron territory and Stanley J. Budzik to succeed Mr. Myers in the Southeast territory. Mr. Meyers, who has been associated with Farrel since 1946, graduated from Yale University in 1941 with a B.S. degree in mechanical engineering. In the years following, he served in the U. S. Army, where he attained the rank of major. Mr. Myers has handled the company's business with rubber and plastics manufacturers in New England and has also initiated a territorial sales and engineering service for Farrel products in the Southeastern states. Mr. Budzik has most recently specialized in the sale of Farrel roll grinders. He joined the firm in 1946 after two years in the U. S. Air Force. Before his military service, he attended the Worcester Polytechnic Institute. He worked in several departments of the company prior to becoming sales correspondent in 1954 and sales engineer in 1956.

Super All Grip Tire

► General Tire and Rubber Co., Akron, Ohio, has introduced a new truck tire which is said to be able to meet any and all weather and road conditions. For both summer and winter use, the "Super All Grip" was designed for maximum traction and long tread life, and to answer haulers' needs for a tire that can perform equally well under either favorable or adverse conditions. The company states that the Super All Grip will pull through snow, slush, mud and sand, has superior stopping ability for wet or icy pavements, and runs quietly and efficiently. Because of its greater non-skid tread depth and unique design, the new tire provides longer tread life and excellent stability. It has two center riding ribs, for smoother ride, noise elimination and stability, flanked by angled cleats and open channels for tractive power and snow-mud ejection. The non-directional tread eliminates tire mounting problems, General Tire said.

Doubles Polyether Capacity

► Union Carbide Chemicals Co. has doubled production capacity of polyether polyols at its South Charleston, West Va., plant. The company states that the expansion was necessitated in large measure by increased demand for polyethers for use in the manufacture of polyether urethane foams. All of the company's process improvements have been incorporated in the design of the new unit. During the past year, Carbide has developed and introduced eight polyethers, under the trade mark "Niax," for use as starting materials in foam manufacture. These polyethers make possible the wide variation in physical properties of foams, which range from completely rigid to soft and flexible, according to Carbide.

Goodall Rubber Elects Dusch

► H. G. Dusch has been elected vice-president for finance of the Goodall Rubber Co., Trenton, N. J. Mr. Dusch, who has been with Goodall since 1926 and has served as secretary-treasurer since 1944, will also continue as secretary. A. E. Blanchar, formerly controller, assistant treasurer and assistant secretary, has been elected treasurer and will continue as controller. Before he joined Goodall in 1945, Mr. Blanchar was with Arthur Young & Co., certified public accountants.

SAE Aeronautics Meeting

► Society of Automotive Engineers, New York, N. Y., recently held the National Aeronautic Meeting at the Hotel Commodore in New York City. Among the papers presented were "Fluid Sealing in Extreme Environments", by A. A. LePera (Wright Air Development Center); "Designing for Use of Viton O-Rings at Elevated Temperatures", by F. H. Pollard (Republic Aviation); "Seals, the Vulnerable Giants", by C. E. Hamlin (North American Aviation); "High Temperature Sealing Studies of Missile Hydraulic Components", A. B. Billet (Vickers); "Progress in Space Age Materials Fabrication", Leon E. Laux and Clyde S. Hill (Martin).

Baracani Joins Dewey and Almy

► A. V. Baracani has joined the Dewey and Almy Chemical Division of W. R. Grace & Co., Cambridge, Mass., as organic chemicals sales representative in Chicago, Ill. He will sell Dewey and Almy's vinyl acetate polymers and copolymers, butadiene - styrene resins and latices, plasticizers and dispersing agents in Illinois, Indiana, Iowa, Missouri and Nebraska. Mr. Baracani was most recently with Advance Solvents and Chemical Division of Carlisle Chemical Works, Inc., and has also served with the Carl Lechner Co. and Nox-Rust Chemical Corp.

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DuPont Builds Elastomer Chemicals Research Unit

► E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced plans to construct a $6 million research laboratory which will consolidate the activities of the company's Elastomer Chemicals Department. To date, research activities of this department have been conducted at two separate locations in the Wilmington area: a laboratory jointly occupied with the Organic Chemicals Department at the Experimental Station and the Jackson Laboratory at Deepwater Point, N. J.

To be devoted to fundamental and long-range research in the field of elastomeric materials, the laboratory will contain 40 fully equipped research laboratories, most of which will provide facilities for two research men working together. Other facilities will include six analytical laboratories; processing and testing areas; offices for patent services and for supervisory personnel; conference rooms; and a lunch room.

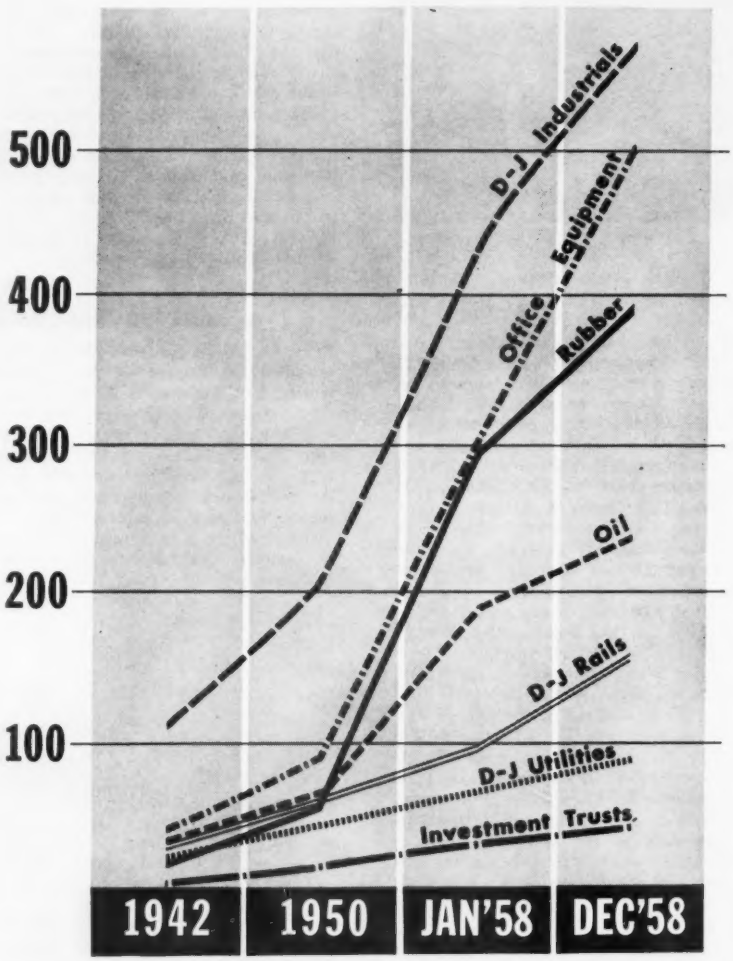
The three-story structure will be located at the east end of the Experimental Station and will be similar in architectural treatment to surrounding buildings. A number of products stemming from DuPont's elastomer research will be incorporated in the new building. The roof will be covered with neoprene coated "Hypalon" synthetic rubber; urethane foams will be used in furniture and wallboards; floor tiles will be made of "Hypalon"; and the driveway will be surfaced with neoprene and asphalt. Construction is scheduled to start immediately with completion expected by late summer, 1960.

In the many years that DuPont has been engaged in elastomer research, the firm has developed chemical rubbers which are highly resistant to oils, chemicals and ozone. Some of these products include neoprene and "Hypalon" synthetic rubber; "Viton" synthetic rubber which is highly resistant to chemicals and temperatures up to 600°F.; and "Hylene" organic isocyanates which are used in the production of a wide range of coatings, foams and solid elastomer products. The research effort of the new laboratory will be both fundamental and applied and will be directed toward new technology and products.

Mobay Shows Urethane Elastomers

► Mobay Chemical Co., Pittsburgh, Penna., has displayed a diverse collection of industrial parts cast of urethane elastomers at the Design Engineering Show, held on May 25-28 at Convention Hall in Philadelphia. Over three dozen variations of urethane elastomer parts made up Mobay's exhibit, ranging in size from a ⅜ inch diameter ball bearing to a 100 pound shaft guide impact ring for a pile driver.

Rubber Industry Stocks Show



► According to D. E. Cable, research chemist of the U.S. Rubber Co., Wayne, N. J., the rubber industry, during the past 16 years, has exhibited a remarkable growth pattern. In eight-year intervals dating from January, 1942, rubber industry stocks showed a per cent gain of over 2000. In two of the eight-year periods, rubber industry stocks were first in order of gain when com-

Acquires Indiana Company

► General Cable Corp., New York, N. Y., has acquired all the outstanding shares of Indiana Steel & Wire Co., Inc., Muncie, Ind., in exchange for 262,200 shares of its authorized but unissued common stock. Indiana Steel, which will operate as a wholly-owned subsidiary of General Cable, produces steel wire principally for use in power transmission and communications. General Cable also announced that Fred M. Crapo, president of Indiana Steel, will continue as president and chief officer, and he has been named a vice-president of General Cable.

Selector Chart Available

► A new General Electric Silicone Rubber Selector Chart, CDS-145, is available from the Silicone Products Department, General Electric Co., Waterford, N. Y. According to the company the chart, one of the most complete silicone rubber specification guides available today, is designed to assist designers and engineers in selecting the proper type of silicone rubber for their particular requirements. CDS-145 contains comprehensive data on applications, typical properties, primary classes and standard industry and military specifications.

Remarkable Growth Pattern

Per Cent of Stock Gains During Each of the Past Two Eight-Year Intervals and over the Two Periods Combined

Name of Group	Per Cent Gain			Order of Gain		
	1/2/42 to 1/5/50	1/5/50 to 1/2/58	1/2/42 to 1/2/58	1/2/42 to 1/5/50	1/5/50 to 1/2/58	1/2/42 to 1/2/58
RUBBER	**290.6**	**466.0**	**2110.0**	**3**	**1**	**1**
Investment Trusts (leverage)	327.0	89.6	710.0	1	12	2
Office Equipment	135.2	241.5	702.5	9	3	3
Oil	95.2	238.0	561.0	18	4	4
Liquor	304.0	53.2	519.0	2	17	5
Paper	106.0	167.0	449.0	15	7	6
Steel and Iron	64.5	232.2	447.5	24	5	7
Building Materials & Equipment	140.8	115.0	418.0	8	10	8
Aircraft Manufacturing	—10.3	445.0	391.0	33	2	9
Installment Financing	190.7	66.4	383.5	5	15	10
Dow-Jones Utilities	190.5	65.6	381.0	6	16	11
Electric Equipment	54.6	186.6	343.0	29	6	12
Grocery Chains	109.1	110.0	339.5	13	11	13
Dow-Jones Industrials	77.9	119.0	290.0	21	9	14
Insurance	71.2	120.6	277.5	23	8	15
Dow-Jones Rails	103.4	84.2	275.0	16	14	16
Automobiles	196.2	24.3	268.0	4	25	17
Dry Goods Chains	141.1	46.4	253.1	7	19	18
Chemical	61.6	88.8	205.0	26	13	19
Foods and Beverages	99.5	51.2	200.0	17	18	20
Drugs	123.8	25.9	181.8	10	23	21
Air Transport	93.0	27.4	146.0	19	22	22
Motion Pictures	122.0	4.7	132.3	11	28	23
Banks	60.3	42.3	128.1	27	20	24
Machinery (heavy)	62.4	39.3	126.2	25	21	25
Automobile Equipment	74.4	25.1	118.0	22	24	26
Farm Equipment	112.1	—2.2	107.3	12	31	27
Packing	79.5	2.8	84.5	20	30	28
Tobacco	44.6	4.9	51.7	30	27	29
Gold Mining	59.2	—11.4	41.0	28	32	30
Railroad Equipment	17.2	16.8	37.0	32	26	31
Textiles	106.9	—34.8	35.0	14	33	32
Copper, Lead and Zinc	22.7	3.0	26.4	31	29	33

All figures compiled from *Barron's*.

pared with other industry stocks. These figures are shown in detail in the accompanying table. The chart shows stock averages for various industry groups in the period under discussion.

It will be seen that the rubber industry stocks, starting from a base of 13.44 in January, 1942, rose to an average of 393.12 by the end of 1958—truly an amazing record.

Nuodex Develops Stabilizer

► Nuodex Products Co., Elizabeth, N. J., a division of Heyden Newport Chemical Corp., has announced the development of "Nuostabe V-134", a barium-cadmium complex stabilizer. The company states that the new product is primarily for use in calendering, plastisol, organosol, extrusion, injection molding and solution formulations. Nuodex claims that the primary advantage of Nuostabe V-134 over standard barium-cadmium complex stabilizers is that it imparts superior heat and light stability and sheet color to these compounds at no additional cost.

Ansonia Names Officers

► Frederick Kenner has been elected president of the Ansonia Wire and Cable Co., Ashton, R. I., succeeding J. S. Chaffee. The company has also announced that John Marsh has been named vice-president in charge of industrial sales. Mr. Kenner, whose career has been closely associated with the wire and cable industry, founded the R. I. Insulated Wire Co. in 1937 and became its president. Mr. Marsh was formerly Ansonia's market specialist for the power utility industry. In his new capacity, he will be based at the company's Ashton, R. I., offices.

Goodrich to Operate Four New Overseas Facilities

*► B. F. Goodrich Co., Akron, Ohio, disclosed at its annual stockholders meeting that within two years the company will be operating three new tire plants and a special purpose synthetic rubber plant abroad in which it will hold majority ownership. One new tire plant is being built in Brazil and is expected to begin operations in November, 1959, while another, now under construction in Australia, is scheduled to begin production during the first quarter of 1960.

A tire plant in Iran is expected to be in production by January, 1960, and a synthetic rubber plant in Holland should be in production by August of this year. Goodrich stated that company plans for 1959 and 1960 encompass further substantial capital expenditure projects in both the domestic and foreign business fields.

New projects already in operation include a new general chemicals plant at Henry, Ill.; a new adhesives plant at Akron, Ohio; and expanded capacities for plastics products at Marietta, Ohio, for hose at Marion, Ohio, and for tire cord at Exeter, Penna.

It was also reported at the meeting that substantial synthetic rubber producing facilities now in production in the United States have exerted a stabilizing effect on natural rubber prices and have helped remove the rubber industry from the "speculative class". In a further effort to protect itself from market fluctuations, Goodrich will soon complete planting 10,000 acres of natural rubber in Africa and small scale production is expected to begin in 1961.

During the meeting stockholders reelected the following directors to serve for one year terms: John L. Collyer, Paul C. Cabot, Amory Houghton, Jr., J. W. Keener, Barry T. Leithead, Elmer L. Lindseth, Deane W. Malott, R. S. Rauch, W. S. Richardson, Reuben S. Robertson, Jr., David Rockefeller, Sidney J. Weinberg, and Langbourne M. Williams.

Wert Named Representative

► Minerals & Chemicals Corp. of America, Menlo Park, N. J., has announced the appointment of Robert W. Wert as field representative for its chemical distributor operations. According to the company, Mr. Wert will provide technical assistance to its 30 chemical distributors in the application of aluminum silicate pigments and attapulgus clays. These materials are used in the manufacture of rubber, adhesives, paints, plastics, inks, fertilizers, and other chemical products. Mr. Wert is a graduate of Duke University, where he received a B.S. degree in chemistry. He joined the company in 1944 and formerly was manager of agricultural sales.

Names in the News

John Slaton, previously with Atlas Powder Co., and **Frank Sciancalepore,** formerly assistant editor of *Chemical Week* magazine, have joined the Inorganic Research and Development Department of the Chemical Divisions of Food Machinery and Chemical Corp.

George B. Coale, vice-president of National Lead Co. and general manager of the Baroid Division, and **Graham W. Corddry,** manager of National Lead's Titanium Division, have been elected to the board of directors of National Lead.

Carl I. Gochenour, formerly manager of product development, has been appointed general manager of product development for the Hooker Chemical Corp. **Dr. Thonet C. Dauphine,** formerly manager of product development, plastics, has joined the General Development Department of Hooker Chemical Corp.

General Mark W. Clark and **Robert B. Jacob,** president of Cadillac Plastic and Chemical Co., have been elected directors of the Dayton Rubber Co.

Margaret M. O'Connor, formerly with Stewart, Dougall & Associates, Inc., has been appointed office manager of the Lee Tire Factory Branch, Lee Tire & Rubber Corp., in New York Ctiy.

Charles W. Duffy has been elected executive vice-president of Standard Products Co.

K. W. Adkins, chief engineer, has been awarded a diamond-set service pin for his 40 years of service with Firestone Tire & Rubber Co.

Robert W. Pressing, formerly manager of molecular sieves production and development, has been appointed general manager of New Products Department, Linde Co., Division of Union Carbide Corp.

J. J. Robson, director of tire engineering and development of Firestone Tire & Rubber Co., has been elected president of the Tire & Rim Association Inc., succeeding **Paul G. Hykes,** of the Budd Co.

William B. Walker, formerly sales representative for the Esso Standard Oil Co., has been appointed by Bonded Oil System, Inc. as its sales representative in the Boston area for solvents and industrial oils.

Raymond F. Schultz, formerly with Hercules Powder Co., has joined Copolymer Rubber & Chemical Corp. as director of research and development.

Dr. Leon Mandelkern, of the Polymer Structure Section, National Bureau of Standards, has received the Arthur S. Flemming Award for 1959 for his "outstanding achievements in scientific research as demonstrated by the contributions he has made to the chemistry and physics of high polymers."

J. W. L. Fordham has been named by the Diamond Alkali Co. as manager of the Research and Development Department at its Plastics Division.

Stacy F. Wolfe has been named sales manager of the Foamex Division of Firestone Rubber & Latex Products Co. **Henry A. Stawniak** has been appointed sales manager for mechanical goods, elastic thread and other items made by Firestone. **William W. Llewellyn** has resigned as vice-president and general sales manager.

Joseph C. Huber and **C. H. Baker** have been awarded gold pins for 40 years continuous service by Goodyear Tire & Rubber Co.

Philip M. Dinkins has been re-elected president and chief executive officer of General Aniline & Film Corp. **John Hilldring,** who had served as chief executive officer, was re-elected chairman of the board of directors.

Arthur S. Armstrong, president and general manager of Cleveland Twist Drill Co., and **Clark H. Johnson,** vice-president of United Engineering and Foundry Co., were elected to the board of directors of United Engineering and Foundry. They succeed **John Quinn** and **James S. Crawford** who have retired from the board after many years of service.

Raymond D. Pearce has been promoted to the position of Eastern district manager of the Republic Rubber Division, Lee Rubber & Tire Corp., with headquarters in Philadelphia, Penna. He replaces **C. R. Conklin** who has been named assistant general sales manager at Youngstown, Ohio.

E. A. Youngman has been named research supervisor in the Synthetic Rubber Department of the Shell Development Co.

John L. Collyer, chairman of the board of the B. F. Goodrich Co., has been named to the board of directors of Eastman Kodak Co.

Fred S. Cantor has been named by American Foam Rubber Corp. as plant manager of its Riverside, N. J. facilities.

John G. Broughton, Jr.

Named Field Sales Manager

► John G. Broughton, Jr., has been named to the newly-created post of field sales manager of the Organic Chemicals Division, Dewey and Almy Chemical Division, W. R. Grace & Co., Cambridge, Mass. The company also announced that Arthur D. Patrick will succeed Mr. Broughton as Eastern regional sales manager, with headquarters at Clifton, N. J. Amos J. Miller has been appointed Midwest regional sales manager at Chicago, succeeding William A. Morton, who was appointed assistant research manager in the Organic Chemicals Division.

Mr. Broughton received a B.S. degree in chemistry from the University of North Carolina in 1949. Prior to joining Dewey and Almy as a sales representative in 1952, he was with Shell Chemical Co. and Eastman Kodak Co. He has been Eastern regional sales manager since 1955. Mr. Broughton is a member of the American Chemical Society and Alpha Chi Sigma.

Clifford S. Farmer, formerly assistant controller, has been promoted to treasurer for the B. F. Goodrich Footwear and Flooring Co. succeeding **Thomas P. Brown,** who is retiring.

Dr. Frank Slezak, previously a research chemist in the Organic Section of the Diamond Alkali Co., has been appointed group leader in the Polymer Section of the company's Research Department.

Harold P. Brown of B. F. Goodrich Co., has been elected 1959 chairman of Akron Section of the American Chemical Society.

Lewis C. Pape has been appointed vice-president in charge of the Foam Division of the Dayton Rubber Co. He was previously sales manager of the division.

C.I.C. Rubber Division Holds Annual Meeting

► The Division of Rubber Chemistry of the Chemical Institute of Canada held its Annual Meeting on May 1, at the Sheraton-Brock Hotel in Niagara Falls, Ontario, Canada. The meeting was attended by 185 persons and featured a morning technical session and an afternoon symposium on "Aging and Weathering of Elastomers." The meeting was followed by the Annual International Meeting of the Buffalo and Ontario Rubber Groups.

At a brief business meeting, the Rubber Division elected the following officers to serve during the 1959-1960 season: *Chairman,* J. L. Macdonald (DuPont Canada); *Vice-Chairman,* Alec Jaychuk (Goodyear); *Secretary-Treasurer,* D. W. Hay (Polymer Corp.); and *Directors,* H. Hencher (H. L. Blachford), Carl M. Croakman (Columbian Carbon Canada), and Wray Cline (Canadian General-Tower).

The morning technical session, under the chairmanship of Carl M. Croakman (Columbian Carbon Canada), included the presentation of four papers. J. M. Campbell (Northern Electric) was the chairman of the afternoon aging and weathering symposium, which included the presentation of five papers. Abstracts of the nine papers follow:

Chemical Nature of Filler Reinforcement. ***Marvin C. Brooks, Fitzhugh W. Boggs and Roswell H. Ewart (U. S. Rubber Co., Research Center, Wayne, N.J.).*** An experimental study designed to establish the effect of the chemical nature of filler surface on reinforcement properties was carried out. The surface of silica fillers was modified by reaction with organo silanes. It was demonstrated that chemical bonding of filler and elastomer could be achieved and was necessary to get reinforcement similar to that obtained from carbon black. The chemical bonds between filler and elastomer were achieved through condensation of unsaturated organo silanes on the surface of hydrated silica fillers, and subsequent co-vulcanization of the unsaturated filler surface and elastomer.

Vinyl and allyl unsaturation on the filler surface was found to bring about maximum reinforcement in Hevea and SBR rubbers, but the less reactive cyclohexenyl unsaturation on the filler surface brought about maximum reinforcement in butyl rubber.

The reinforcement due to the chemical bonding of filler and elastomer is demonstrated by improvements in performance of vulcanizates containing treated filler when compared to vulcanizates of the same elastomer containing untreated filler. These improvements in performance are: increased modulus, increased tensile strength particularly at high temperature, lower permanent set, improved abrasion resistance, better resistance to fatigue, and lower hysteresis.

Properly treated fine particle silica fillers were found to be equal to fine particle carbon black in reinforcement properties, and properly treated kaolin was found equal to the large particle carbon blacks. Practical methods of obtaining these improvements in reinforcement have been developed through the use of compounding agents which react with the surfaces of the fillers during the course of normal compounding. These new compounding agents were described.

Some Results of Kinetic Studies of Sulfur Vulcanization in the Presence of Accelerators ***Dr. Otto Lorenz (Research Division, Goodyear Tire & Rubber Co., Akron, Ohio).*** After a short survey of the different sulfur bonds formed during vulcanization, methods for the determination of polysulfides in rubber vulcanizates were mentioned, including reduction under suitable conditions (with lithium aluminum hydride), and isotope exchange reaction. The dependence on the amount of polysulfide sulfur was discussed in relation to the nature of accelerator, time of vulcanization, and temperature of vulcanization. It was pointed out that basic accelerators (diphenylguanidine) form more polysulfides than mercaptobenzothiazole or its derivatives. The amount of polysulfides is a function of vulcanization which goes through a maximum, showing that polysulfides are transformed into more stable compounds during the further course of the vulcanization. No polysulfides are formed when thiuram disulfides are used as vulcanizing agents in the absence of sulfur.

The formation to zinc sulfide during the cure was discussed and in connection with this it was shown that zinc-containing intermediates are formed. Portions of these intermediates are presumably zinc-containing cross-links which largely decompose with formation of zinc sulfide and more stable sulfur linkages.

Silicone Rubber Developments. ***Philip C. Servais (Dow Corning Corp., Midland, Mich.).*** The properties, processing, growth and application of silicone rubber were reviewed. Comments were made on its potential as service conditions imposed on rubber become more severe. This synthetic rubber is unique in its resistance to heat, cold and weathering, and engineers often find these properties useful in solving their design problems. In many instances they use silicone rubber where organic rubber is unsatisfactory, to simplify equipment design, and to increase the service life of rubber parts in critical applications.

There seems to be no limit to the ways in which silicone rubber can be used by a resourceful designer. Today, silicone rubber parts can be seen doing such varied things as sealing steam irons, baking ovens and automatic transmissions. Silicone rubber insulates electric motors, generators and wires subjected to extremes of environment. Seals, ducts and diaphragms are found in modern high speed aircraft and missiles. Valves, drains and arteries of silicone rubber are being used by physicians.

A New Chlorine-Containing Butyl Polymer. ***R. E. Clayton, J. V. Fusco and L. T. Eby (Market Development Division, Enjay Co., Inc., Elizabeth, N. J.).*** Physical and chemical properties of butyl rubber have been markedly enhanced by introduction of chlorine into the molecular structure. This modification gives improved compatibility with other elastomers, faster cure rate and greater stability of its vulcanizates to heat. Its excellent ozone resistance and low permeability to gases are similar to butyl rubber.

The unique vulcanization characteristics are attributed to the presence of both chlorine and unsaturation in the polymer chain. Chlorine is present to the extent of about 1.2 per cent by weight and is in about equal molecular proportion to the unsaturation. Reactivity of the chlorine demonstrates its allylic nature. The variety of vulcanization systems are therefore available, several of which are not operable in elastomers which contain no halogen. This new polymer is practical with respect to cost and processability. Its usefulness at temperatures up to 400°F. were demonstrated. Compounding and applications of this new elastomer were discussed.

Theory and Practice of Antiozonant Usage. ***T. H. Newby (Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.).*** The deterioration of all types of stressed rubber goods by ozone attack is a well-known phenomenon. It is most familiar to the public in the form of cracks in tires and cracks in molded rubber goods such as hoses, covered wire, automotive stripping, etc. Great advances have been

made in the past few years in understanding the way in which ozone attacks rubber goods. A number of new chemicals have been commercialized which do an excellent job in preventing or delaying rubber deterioration due to ozone. New theories of antiozonant protection were described and mention was made of specific antiozonants which are now available for rubber protection.

Ageing of Rubber: Effects of Metal Contamination. ***B. N. Leyland and R. L. Stafford (Imperial Chemical Industries Ltd., Manchester, England).*** The pro-oxidant effect of small amounts (20 to 100 parts per million) of some metals in raw rubbers, when included as the salts of weak organic acids was demonstrated by oxygen-absorption measurements. Attention was drawn to the differences in the behavior of raw natural rubber and SBR polymer. Both zinc diethyldithiocarbamate and tetramethyl thiuram disulphide were shown to inhibit the metal-catalyzed oxidation of raw rubbers. Since, however, neither of these compounds can be used in polymers which are subsequently to be vulcanized with sulfur, a different type of inhibitor is required.

A re-examination of the synergism of antioxidant mixtures in the metal-catalyzed oxidation of sulfur-vulcanized natural rubber has led to the development of a metal-inhibitor which to some extent shows the following interesting properties: it is a non-staining inhibitor of the metal-catalyzed oxidation of raw rubbers; and at the same time it is a conventional non-staining antiozidant in vulcanized rubber, effective both in the presence and absence of metal contamination.

Development of a Low Temperature Antichecking Wax. ***S. W. Ferris and J. S. Sweely (Sun Oil Co., Marcus Hook, Penna.).*** Waxes are widely used to protect rubber from ozone attack. Wax blooms to the surface and forms a protective film. At low temperatures, rate of blooming is reduced, and the wax films tend to become brittle. It is therefore frequently more difficult to protect rubber at low temperatures than at high or normal temperatures. On the other hand, some rubber formulations are much less subject than others to ozone degradation at low temperature.

Rubber formulations were compared, and one selected which most waxes failed to protect at low temperature. This recipe was tested with various loadings of a number of narrow fractions of petroleum wax, which differed widely in their physical properties and chemical constitution. Testing of the rubbers included cabinet exposure with 25 pphm of ozone at 120° and 0°F., and year-round outdoor exposure. Results were correlated by means of melting point and refractive index at 212°F. of the waxes. With this correlation as a guide, a blend of commercial waxes was made which gave excellent protection under the aforementioned three test conditions. The experimental wax was tested under normal winter service conditions in and around Edmonton, Canada, in comparison with two commercial antichecking waxes, and gave better protection, at the same loadings, than either of the commercial products.

A Quantitative Ozone Test for Small Specimens. ***D. C. Edwards and E. B. Storey (Polymer Corp. Ltd., Sarnia, Ontario, Canada).*** A new ozone test method was described, in which measurements were made of the movement that occurs when two equal specimens, one protected by a loose-fitting polyethylene sleeve, and one unprotected, were mounted in series and exposed to ozonized air. The method is simple since it uses small, easily prepared specimens and produces quantitative data. The effective depth of cracks in the unprotected specimen may be estimated and is found to increase linearly with time for cases where the number of cracks is large. Illustrative results were presented showing a distinction between SBR polymers produced in "hot" and "cold" polymerization systems and the effects of raw polymer unsaturation and state of cure on the ozone resistance of butyl rubber vulcanizates.

Antiozonants in Tire Sidewalls. ***Dr. Glen Alliger and J. M. Willis (Firestone Tire & Rubber Co., Akron, Ohio).*** The primary purpose of this study was to test substituted p-phenylenediamines in the black sidewalls of tires under conditions of normal tire service compared to a blend of conventional antioxidants and to a substituted dihydroquinoline type antiozonant. Test locations used were Akron, Los Angeles and Hamilton, Ontario. The effect of storing tires for approximately two years before testing was investigated. Secondary objectives were correlation of service and static roof aging tests of tire sidewalls and correlation of service tests with laboratory ozone exposure results.

SBR black passenger tire sidewalls had the best resistance to ozone weathering in service when protected by substituted p-phenylenediamine antiozonants. The improvement offered by this type of antiozonant when replacing control antioxidants is much less pronounced in natural rubber sidewalls. When the tires with SBR black sidewalls were allowed to age for two years before application, antiozonant effectiveness dropped off greatly and the level of protection was equal to or less than that offered by a combination of more conventional antioxidants which were used in the control stock. These latter antioxidants show little or no evidence of activity as antiozonants.

Exposure of mounted, inflated tires under static conditions gives a different type of weatherchecking than the service tests on cars. Although the relative efficiency of the protective agents is about the same in both tests, the static exposure of tires is not recommended for general usage because of difference in kind of checks obtained and in rate of checking. Correlation between service tests of tire sidewalls and laboratory ozone exposure of the stocks in a weatherometer is excellent, particularly if the laboratory test is run on a combined static/dynamic basis.

Rhode Island Club Meets

► The Rhode Island Rubber Club held its spring meeting on April 2, at the Pawtucket Golf Club, Pawtucket, R. I., with over 175 members in attendance. The technical session featured a talk on "Viton" by Edgar Tufts (DuPont) and the dinner meeting was highlighted by Henry Steeger, executive director of Massachusetts Council for Public Schools, who spoke on "Position of Laymen in Education."

In his talk, Mr. Tufts gave a basic description of Viton and presented data on "Viton Latex LD-242." He explained that this material is still in the experimental stage, however, there were indications that the properties of Viton have been carried over to the latex product. Mr. Tufts pointed out that although plasticizers are not usually used in Viton, some work was being done with plasticizers in an attempt to obtain improved low temperature properties. He discussed some of the problems encountered in the production of the elastomer, and described a two-step cure system.

Farrel-Birmingham Names Manager

► Farrel-Birmingham Co., Inc., Ansonia, Conn., has announced the appointment of Elmer F. Myers as manager of the Akron territory with offices at 665 W. Market Street. He succeeds William R. Bowen, who has transferred to the company headquarters at Ansonia to take the post of research and development engineer. Mr. Myers, who joined Farrel in 1946, managed the company's southeast territory for seven years. Mr. Bowen joined the company in 1934, and managed the Akron office since 1946.

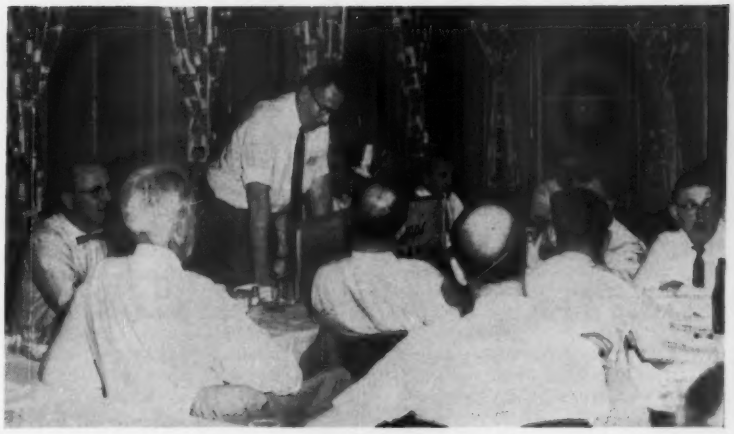
Synthetic Symposium Scheduled

► The Second International Synthetic Rubber Symposium, scheduled to be held at Church House, Westminster, London, on October 11 to 12, 1960, will feature lectures by well known synthetic rubber experts from North America, Great Britain and Western Europe. The full program will be announced later. Further information on the symposium may be obtained from *Rubber and Plastics Age*, Gaywood House, Great Peter Street, London, S. W. 1, England.

Connecticut Group Hears About Aeronautical Uses of Rubber

► A panel discussion on "Aeronautical Applications of Rubber" and a talk on "Nitrile Silicone Rubber" were the highlights of the annual spring meeting of the Connecticut Rubber Group, which was held on May 22, at Rapp's Paradise Inn, Ansonia, Conn., with over 135 members and guests in attendance. Dr. David P. Spalding (General Electric) presented the pre-dinner talk on nitrile silicone rubber, and served as moderator for the after-dinner panel discussion. The panelists included Donald E. Manning, design metallurgist, Pratt Whitney Aircraft Division, United Aircraft Corp.; Herbert E. Todd, project chemist, also with Pratt Whitney; and William H. King, Acushnet Process.

In his talk, Dr. Spalding reviewed some of the chemical and physical problems encountered in developing oil and solvent resistant, high temperature nitrile silicone rubbers. He reported that the new elastomers are useful over the entire —100°F. to +500°F. temperature range of regular silicone rubber. Processing methods, physical properties of the new polymer, and potential automotive applications for nitrile silicone rubber were included in Dr. Spalding's presentation.



A panel discussion on "Aeronautical Applications of Rubber" was the highlight of the annual spring meeting of the Connecticut Rubber Group, held on May 22, at Ansonia, Conn. Standing, addressing the group is Donald E. Manning (Pratt Whitney). Seated at the head table, left to right, is Dr. David P. Spalding (General Electric), moderator; Herbert E. Todd (Pratt Whitney); and William H. King (Acushnet Process.)

Specifying Materials

The first panelist, Mr. Manning, spoke on "Specifying Elastomeric Materials for Aircraft." He stated that the variety of elastomeric materials used in the modern airplane, its propulsion system and auxiliary equipment runs the gamut of available materials from natural rubber to the newest synthetic polymers. He pointed out that these materials come in a great number of different forms, and the conditions to which they are exposed involve a great range of temperatures and liquids. According to Mr. Manning, the function of any specification is to provide an adequate description of the material so that the vendor may know what properties and characteristics his material is expected to possess and so that the purchaser may feel confident that the material meeting the specifications will be substantially uniform from batch to batch from a given vendor and from one vendor's material to another's.

Mr. Manning then discussed the preparation of specifications, taking a close look at specifications-by-properties method, the method by which rubbers for aviation use are specified. He expressed the opinion that present specifications for rubber are, to a large extent, over-rated, and what is needed is a fresh approach to specifications, to weed out the meaningless requirements and to replace them with tests which are representative of the conditions under which the material will be used.

Herbert E. Todd, the second panelist, discussed "Testing Elastomeric Materials for Aircraft Powerplant Use." He stated that the group had already heard a discussion on the relative merit and shortcomings of specifications which control characteristics of materials by common property requirements and those which utilize functional tests. He explained that there is a third approach, to analyze the functional property requirements for a particular type of application and to select fundamental tests which measure the specific properties involved.

Mr. Todd, in discussing seals, first considered two representative groove configurations used for static seal applications for aircraft. He explained that examination of these seal and cavity configurations reveals that the conventional property requirements of rubber specifications such as tensile strength and elongation are little utilized by seals in their functional capacity, but rather those properties involved by their confinement and compression.

The tests chosen to measure these functional properties were compression set, compression-deflection (which measures compressive stress) and compression relaxation. He stated that another test factor to be considered with newer types of elastomers is that of temperature, and he presented examples of compression set values for silicone rubber compounds at temperatures of from 300° to 500°F. He remarked that one area where further investigation is needed to develop tests which are indicative of functional properties, is in the evaluation of the low temperature resilience of seals.

He remarked that his discussion may have given the erroneous impression that the more commonly used tests such as tensile strength, elongation, tensile stress and tear strength are worthless. However, he explained, they are excellent fundamental tests which are invaluable for testing materials for applications in which these properties are required. He emphasized that testing, and hence also specifications, should be less concerned with the overall properties of a material or group of materials and more concerned with their performance requirements.

Compounding for Aircraft

"Aircraft Specification Compounding" was the subject of the talk given by the final panelist, William H. King. The compounder, he said, must formulate a stock which can be manufactured on the most economical basis into a product which will be in accord with the requirements of a specification and be adequate for a specific application. To perform this task satisfactorily, he stated, the compounder must thoroughly familiarize himself with the specification at hand—analyzing the requirements and intent as well as the possible products the specification is intended to cover. After the compounder is familiar with the specification, he should, explained Mr. King, then consider the methods of mixing and processing the compound as well as curing and finishing the product.

Mr. King pointed out that in selecting the proper elastomer, the requirements that are generally covered by specification and which guide the compounder are original properties, heat resistance, fuel resistance, oil resistance, compression set, weather resistance, and low temperature flexibility. After considering these factors, the compounder is ready to write experimental recipes for laboratory evaluation. In discussing laboratory testing of slabs and parts, Mr. King emphasized that the compounder should strive to have his evaluation conducted on the same equipment and under the same conditions as those employed by the end user.

West Coast News

► The Los Angeles Rubber Group., Inc., acted as local supporting group for the spring meeting of the Rubber Division of the American Chemical Society, which was held on May 13-15 at the Biltmore Hotel in Los Angeles. The local arrangements committee consisted of A. J. Hawkins and B. R. Snyder, *co-chairmen;* Carl E. Huxley, *Housing;* E. J. Lynch, *Registration;* Howard R. Fisher, *Program;* D. C. Maddy, *Finance;* John L. Ryan, *Publicity;* Charles M. Churchill, *Ladies' Entertainment;* Bernard R. Hodowski, *Banquet;* R. G. Luskin, *Banquet Ticket Sales;* Dr. Edward G. Partridge, *Plant Tours;* and Dr. Harry L. Fisher, *Honorary Member and Consultant.*

New Tlargi members include Bill J. Bryant (Stillman Rubber); Frank V. Celiberti (Naugatuck Chemical); George S. Cole, (Cole & Perry); Glen Dunbar (Injecto Rubber Products); Karl R. Feise (Goodyear); Thomas C. Hunter (Harwick); Ray L. Hurst (H. M. Royal); Everett W. Johnson (C-L Chemical); Charles E. Lake (C. P. Hall); Stanley A. Meyer (U. S. Rubber); Walter W. Perry (Cole & Perry); Leonard E. Rose (Farrel-Birmingham); Philip W. Shaffer (Shell Chemical); George J. Shalhub (Naugatuck Chemical); Kenneth R. Smart (Kirkhill Rubber); James A. Threadgill (Bettis Rubber), and Jan Visscher (Western Insulated Wire).

► Frank M. Francis, vice-president and manager of the West Coast Division of A. Schulman Inc., has completed his 25th year with the organization. Mr. Francis began as a stenographer with the company at its East St. Louis office in 1934 and has served in various capacities at its offices in Boston and Akron. A specialist in the field of plastics, Mr. Francis was called upon to work with the War Production Board in Washington during World War II.

► C. H. Huxley, A. C. S. Rubber Division director and Tlargi director has been transferred to the Chicago office of the Enjay Co. as polymer sales supervisor for the Western Division. He joined Enjay in 1955 as the West Coast representative. Mr. Huxley is succeeded on the West Coast by Floyd Floren.

► R. D. Abbott Co. has been selected West Coast agent for the Pitt-Consol Chemical Co. and for the adhesives line of the Lord Manufacturing Co.

► Charles Churchill has joined the California Rubber Products Co. as sales manager, while Gil Hammons has been named plant superintendent.

► Army chemist, W. D. England, reporting before the 75th annual meeting of the Division of Rubber Chemistry of the American Chemical Society, has announced that Pasadena, Calif., has been chosen as an ideal site for testing the destructive effects of ozone on rubber. The area has been selected, he said, because of its high atmospheric concentration of that element and other air pollution agents. After only two to three weeks exposure in Pasadena, Mr. England explained, deep cracks developed in tires, windshield wipers, hose and rubber bumpers not protected by newly developed "anti-ozonants". Rubber parts that had been protected by antiozonants stood up for a year and sometimes two years in Pasadena, Mr. England said. He added "One or two years protection in Pasadena appears to be equivalent to three to five years in other areas.

► Construction of a new Research and Development Building is now underway at the W. J. Voit Rubber Corp. To be located on the company's 37 acre plant site in Santa Ana, Calif., the 15,000 square foot building will house all Voit research and development personnel in a single facility large enough to meet the needs of the near future and to provide for orderly expansion when necessary. Occupancy of the new building is scheduled for August 31. Total cost will run to about $300,000 not including cost of equipment for development and testing of pilot plant and production models of equipment, products or processes. The single story combination reinforced brick and concrete building will include research, engineering and development offices, laboratories and shop areas.

► Robert W. Martin has been appointed head of the Thermo-plastics Department for Emeryville Research Center of the Shell Development Co. Mr. Martin, who previously served in New York as technical assistant to the president of Shell Development, joined the Emeryville staff in 1952 as a chemist. He was appointed a research supervisor in 1953 and prior to his most recent assignment was acting assistant department head. Mr. Martin is the author of a book on the chemistry of phenolic resins which was published in 1956.

► Robert G. Luskin, formerly West Coast District manager of the Chemical Division for the Goodyear Tire & Rubber Co., has joined the American Chemical Corp. as a sales manager. He will be succeeded at Goodyear by R. B. Williams.

John R. Draves

Joins Goodrich-Gulf Chemicals

► John R. Draves has joined Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, as a sales engineer serving in the New England area. Mr. Draves is a native of Darien, Conn., and attended Union College, Schenectady, N. Y., where he received a B.S. degree in chemistry. He later attended the University of Akron, taking special courses in rubber chemistry. His experience in the rubber industry includes eight years with a major rubber company in Akron. Mr. Draves is a veteran of World War II, a member of the American Chemical Society and the Akron Rubber Group.

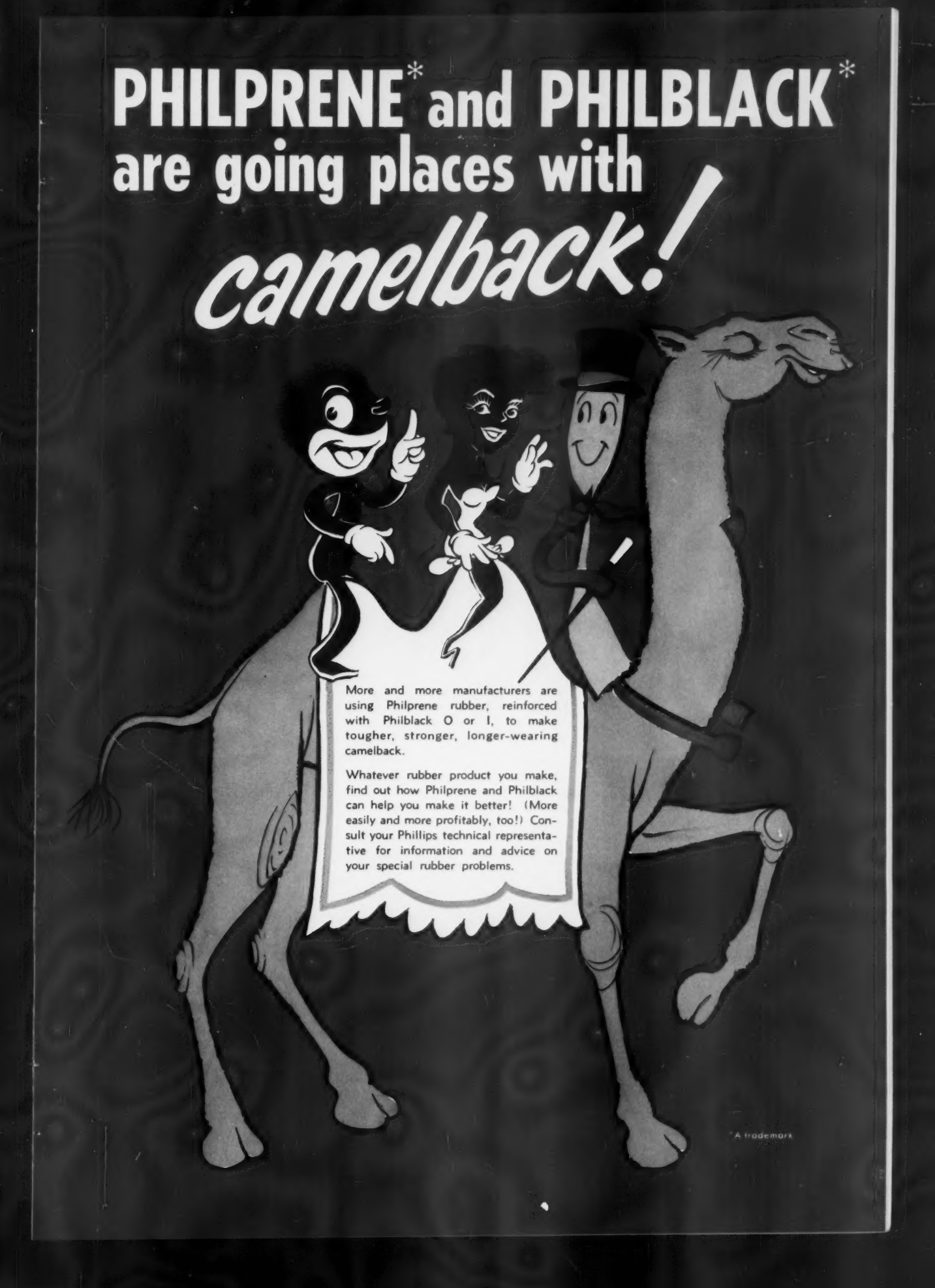
Phillips Makes New Masterbatches

► Phillips Chemical Co. has begun commercial production of dispersant-free cold rubber masterbatches at its plant near Borger, Texas. According to Phillips, production of the new masterbatches will result in savings in mixing time; added mixing capacity; easy processing; uniformity of compounding; contribution to consumer plants cleanliness; and full maintenance of quality in the final product. The first dispersant-free pigmented rubbers to be made are "Philprene 6661" and "Philprene 6662," both of which are based on 1500-type latex. Phillips also plans to produce several other types of these masterbatches.

Electric Auto-Lite Elections

► Electric Auto-Lite Co., Toledo, Ohio, has announced the election of Robert H. Davies, formerly a vice-president of the Clark Equipment Co., as president and director, succeeding James P. Falvey, who has been named chairman. Mr. Falvey succeeds Gurdon W. Wattles, who has been appointed chairman of the executive committee. C. Russell Feldmann, formerly chairman of the executive committee, will continue as a director and a member of the executive committee.

PHILPRENE* and PHILBLACK* are going places with *camelback!*



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Whatever rubber product you make, find out how Philprene and Philblack can help you make it better! (More easily and more profitably, too!) Consult your Phillips technical representative for information and advice on your special rubber problems.

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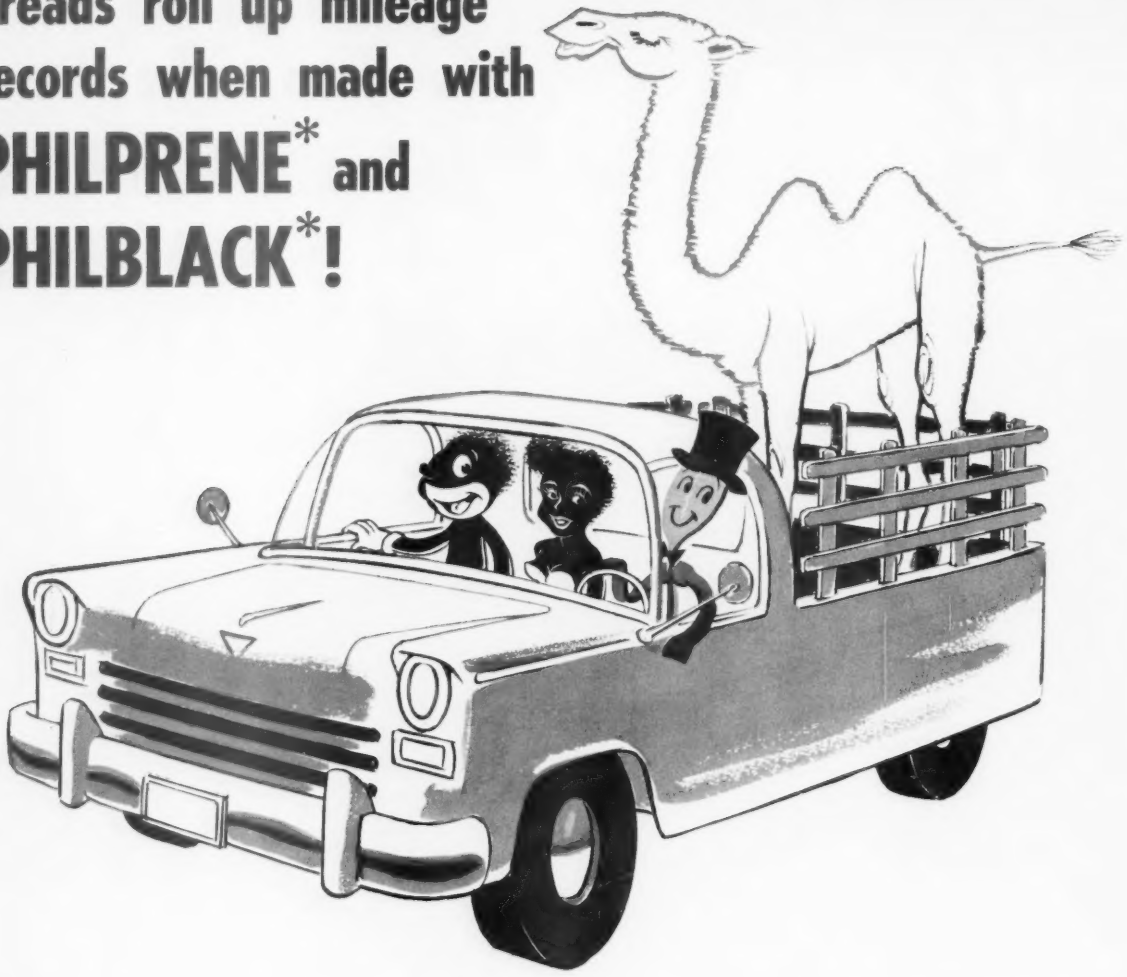

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	NON-PIGMENTED	PIGMENTED WITH PHILBLACK
HOT	PHILPRENE 1000 PHILPRENE 1009 PHILPRENE 1001 PHILPRENE 1010 PHILPRENE 1006 PHILPRENE 1018 PHILPRENE 1019	
COLD	PHILPRENE 1500 PHILPRENE 1502 PHILPRENE 1503	PHILPRENE 1603** PHILPRENE 1605 **Pigmented with EPC Black
COLD OIL	PHILPRENE 1703 PHILPRENE 1708 PHILPRENE 1712	PHILPRENE 1803 PHILPRENE 6605 PHILPRENE 1805 PHILPRENE 6608 PHILPRENE 6604 PHILPRENE 6620

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PHILLIPS CHEMICAL COMPANY

Rubber Chemicals Division, 318 Water St., Akron 8, Ohio
District Offices: Chicago, Dallas, Providence and Trenton
West Coast: Harwick Standard Chemical Company, Los Angeles, California
Export Sales: 80 Broadway, New York 5, N. Y. European Office: Limmatquai 70, Zurich 1, Switzerland

Boston Group Hears About New Synthetic Elastomers

► Approximately 200 members attended the Boston Rubber Group technical meeting on March 20 at the Hotel Somerset in Boston, Mass. The technical session featured three speakers who discussed the topic of "New Synthetic Elastomers for Coatings, Extrusions and Molded Products."

James H. Lorenz (Union Carbide) spoke on "Cyano Silicones." He gave a review of the past history of silicone elastomers with a comparison on the preparation of the dimethyl silicone gums and the cyano-containing silicone gums. The parameters within which this new class of polymers is expected to be useful were characterized by graphs on high temperature stability, low temperature flexibility and solubility data. Mr. Lorenz emphasized that lowest volume swell in a solvent doesn't always mean best performance, and compounds, to be most useful, should also be balanced in other physical properties.

The second speaker, James V. Fusco (Enjay) discussed "Halogen Containing Butyl Elastomer." He remarked that a new chlorine-containing elastomer based on isobutylene as the main ingredient is now available. It cures rapidly to relatively high states of cure to give heat resistant vulcanizates, and the reactive allylic chlorine provides a point of reaction for a wide variety of curing systems. Mr. Fusco pointed out that vulcanization with a thiuramdisulfide or polymethylol resin in combination with zinc oxide is fast, and established cross-links are thermally and chemically stable. He explained that they give good compression set resistance under static or dynamic conditions, and ozone resistance is excellent. According to Mr. Fusco, this new rubber is finding application in essentially all phases of the rubber industry where heat resistance is important or where compatability, age resistance and low air permeability properties are necessary.

Nitrile-Silicone Rubber

In his discussion of "Nitrile Silicone", Richard M. Savage (General Electric) stated that in the past 15 years the over-all silicone rubber business has grown to the point where approximately $50 million worth of silicone rubber goods were manufactured in 1958. He discussed the experiments and tests that were made on various nitrile silicone batches in order to develop a silicone rubber that will have a great deal of oil and grease resistance. He explained that although there have been significant improvements in oil and solvent resistance, they should be considered only as indicators of the family of new nitrile silicone rubbers to come. After the technical session, Roger Stellar (Goodrich) was awarded the past-chairman's pin.

High Polymer Forum

► The Ninth Canadian High Polymer Forum will be held at the Guild Inn, Toronto, Ontario, Canada, on October 26-28, 1959. The Forum is sponsored by the National Research Council of Canada in cooperation with the Chemical Institute of Canada, and is devoted to all aspects of polymer science. Authors wishing to submit papers for presentation at the Forum should write to: Programme Chairman, Dr. L. A. McLeod, Research and Development Division, Polymer Corp. Ltd., Sarnia, Ontario, Canada. Titles and abstracts will be required by August 1. General information concerning the Forum may be obtained from Dr. M. H. Jones, Chairman, Ninth Canadian High Polymer Forum, Ontario Research Foundation, 43 Queen's Park, Toronto 5, Ontario, Canada.

Mansfield Plans Stock Split

► Mansfield Tire & Rubber Co., Mansfield, Ohio, has announced plans to split its common stock two-for-one. The proposal was presented to stockholders for approval at a special meeting on May 27. Mansfield stockholders voted to increase the authorized number of common shares to 2,000,000 shares of $2.50 par value from the presently authorized 1,000,000 shares of $5.00 par value. The stockholders also voted on a proposal to sell a new issue, amounting to $5,038,300 of convertible subordinated debentures which will be first offered to stockholders for subscription. The company has called for redemption on June 1, of the currently outstanding 5 per cent convertible debentures, which carry conversion rights into common stock on or before May 18, at a conversion price of $20 per share.

Thiokol Appoints Dunn

► Chemical Division of the Thiokol Chemical Corp., Trenton, N. J., has announced the appointment of John T. Dunn as sales manager reporting to Donald E. Fish, director of marketing for the division. Formerly sales manager of the company's butyl sales, Mr. Dunn is now responsible for the sales of polysulfide rubber, liquid polymers and rubber chemicals. Before he joined Thiokol in 1956, Mr. Dunn was associated with the U. S. Rubber Co. at its Canadian affiliate, Dominion Rubber Co., Ltd. There he served successively as rubber compounder, development engineer and field technical service engineer. In 1946, he was appointed manager of belting, hosing and packing sales.

Ontario Group Elects Officers; Hears Davis on Curing Systems

► The 1959-1960 officers of the Ontario Rubber Group were elected by acclamation by more than 130 members who attended the meeting of April 7, at the Pickfair Restaurant, Mimico, Ontario, Canada. The meeting included a technical session which featured a talk by Arnold R. Davis (American Cyanamid) on "Curing Systems." The officers elected for the coming season are: *Chairman*, R. R. Tartaglia (B. F. Goodrich Canada); *Vice-Chairman*, D. G. Seymour (Cabot Carbon of Canada); *Secretary*, W. R. Smith (Dominion Rubber); *Treasurer*, Lloyd Lomas (St. Lawrence Chemical); *Chairman Membership Committee*, B. B. Williams (Feather Industries); *Chairman Entertainment Committee*, W. R. Hogg (Naugatuck Chemical); *Toronto Representative*, F. Capstick (Dunlop Canada); *Kitchener Representative*, Charles Fletcher (Dominion Rubber); *Hamilton Representative*, Bruce Austin (Firestone); and *Representative-at-Large*, Dave Hay (Polymer Corp.)

In his talk on curing systems, Mr. Davis covered all the usual methods of curing natural and synthetic rubbers, both from the point of view of materials and conditions necessary for vulcanization. His discussion described both sulfur and non-sulfur cures, and he also went into some detail to describe the curing systems used in the vulcanizing of neoprene and several of the newer types of elastomers. For curing natural and SBR compounds, Mr. Davis told about the several types of accelerators available, where they were used to best advantage, and under what conditions.

Allied Plans Polyethylene Unit

► Allied Chemical Corp., New York, N. Y., has announced plans to construct a new polyethylene plant for the production of both low and high molecular weight polymers. The firm is presently working on the design of the proposed unit, which will employ a low pressure process developed by Allied and will be located in an area where substantial quantities of ethylene are available. Allied is also installing additional polyethylene capacity at its present plant in Buffalo, N. Y.

DuPont Plans Mylar Unit

► E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has announced that a second plant for the manufacture of "Mylar" polyester film will be built near Florence, S. C. The facility, which is expected to cost almost $20,000,000, will enable DuPont to almost double its production of the industrial and packaging film. Construction will begin in June, with completion of the unit scheduled for early 1960.

Canadian News

► The C. I. C. Medal was awarded to Richard H. Manske, director of research for the Research Laboratories of the Dominion Rubber Co., Ltd., at the 42nd Annual Conference of the Chemical Institute of Canada, which was held on May 25 to 27 at Halifax, Nova Scotia. The medal is awarded annually by the Institute for outstanding contributions to Canadian chemistry and chemical engineering and is the highest honor the Institute can bestow. The medalist discussed "Fifty Years with Alkaloids". A noted organic chemist, Dr. Manske has many interests including an absorbing interest in alkaloids; in the inorganic chemistry of lead, silver and other metals, and in reforestration. He is a graduate of Queens and Manchester Universities and was with the National Research Council in Ottawa before he joined Dominion Rubber in 1943.

The Institute also announced the election of I. C. M. Rush (Polymer Corp.) as a fellow. This honor is awarded to a limited number of the Institute's professional members each year in recognition of their contribution to Canadian chemistry and chemical engineering. This year, 29 prominent chemists and chemical engineers were elected.

During the meeting, E. Gordon Young, director of the Atlantic Regional Laboratory of the National Research Council, was elected president of the Chemical Institute of Canada for 1959-1960, while Wilfred N. Hall, president of the Dominion Tar and Chemical Co., Ltd., was named vice-president.

Dr. Young is a graduate of McGill, Cambridge and Acadia Universities and carried out research work at the University of Chicago, Lister Institute in London,, England, and the Institute Pasteur in Paris. Before he joined the Atlantic Regional Laboratory in 1950, Dr. Young was an associate professor of biochemistry at the University of Western Ontario in London and professor of biochemistry at Dalhousie University, Halifax.

Mr. Hall is a chemical engineering graduate of the University of British Columbia. After graduation in 1929, he joined Canadian Industries, Ltd. as a chemist and worked in the company's plants in Toronto, Windsor, Cornwall, Shawinigan Falls and Montreal. In 1945, he became development engineer, then vice-president in charge of development for Standard Chemical Co., Ltd. and later vice-president in charge of operations. Mr. Hall was appointed vice-president of Dominion Tar & Chemical Co., Ltd., in 1950; executive vice-president in 1955; and president in 1957.

A five-page report entitled "Trends in the Rubber Products Industry", edited by D. W. Emmerson, M. C. I. C., and reprinted from *Chemistry in Canada,* is available free of charge through the Institute. The report deals with products of the industry; raw materials; production techniques; and research, development and education. Write to Chemical Institute of Canada, 18 Rideau St., Ottawa 2, Ont.

► Canadian tire sales will almost double their present figures by 1965, according to Ronald B. MacPherson, economist for DuPont of Canada, in an address to the Canadian Tire Dealers and Retreaders Association. Car registrations in Canada are expected to rise from 3.5 million in 1959 to over 5 million in 1965. Mr. MacPherson bases his forecast on the theory that car sales are directly proportional to the gross national product, stock market indices, levels of personal savings and installment credit, money supply and the "Pressure Index".

The speaker claimed that 3.2 million new cars will be sold between 1959 and 1965. To support his argument, he stated that the Gross National Product will jump to $45 billion in 1965 from its present $32 billion level; the Toronto Stock Exchange industrial index rose to 530.22 from 422.68 a year ago; the Pressure Index, which measures the spread between cars one and two years old and those in the three to five-year category, increased to record highs; there has been a sharp upswing in personal savings accounts; many car installment loans have been paid up; there has been a 12 per cent boost in the nation's money supply; and there has been no change in bank loans.

► J. C. R. Warren has been appointed coordinator of research and development for the Dominion Rubber Co., Ltd. He will coordinate all research and development activities of the various company divisions and will be responsible for the research laboratory at Guelph, Ont., where he will make his headquarters. Mr. Warren has served Dominion Rubber for 14 years, during which time he has been concerned with development and market activities at the Naugatuck Chemicals Division at Elmira, Ont. Before joining Dominion Rubber, he was associated with the Ontario Research Foundation. Born in Hamilton, Ont., Mr. Warren has a Bachelor of Arts in Honors Chemistry from McMaster University and completed further studies at the Universities of Michigan and Toronto. He is the author of several papers and holds 19 patents.

J. B. Prendergast

► Gutta Percha & Rubber, Ltd., Toronto, Ontario, has announced the appointment of J. B. Prendergast as its president and general manager, succeeding M. O. Simpson, Jr., who has been named chairman of the board of directors. Prior to this appointment, Mr. Prendergast was vice-president of marketing. Mr. Simpson had been president of Gutta Percha since 1956.

► Shawinigan Chemicals, Ltd., Montreal, Quebec, has named C. K. Lockwood, formerly vice-president of sales, to the post of vice-president and manager of its new Industrial Chemicals Division. The company also announced that G. N. Hale, formerly vice-president and general manager of Canadian resins and chemicals, has been appointed manager of the company's new Canadian Resins and Chemicals Division.

► DuPont of Canada has begun operations at a new nylon tire yarn unit recently installed at its Kingston, Ont., plant and has also expanded production facilities for adipic acid and hexamethylene diamine at Maitland, Ont. Nylon intermediates will go mostly into tire cord and the remainder will satisfy other nylon needs. Facilities at Kingston and Maitland cost $7.5 million in addition to a new $750,000 laboratory recently completed at Kingston for work on nylon tire cord, nylon resin and nylon textile applications.

► Reichhold Chemicals (Canada), Canadian subsidiary of Reichhold Chemicals, Inc., has announced that it is offering its common stock to the Canadian public for the first time. According to the company, it is selling 35,000 shares at $17.50 per share to boost the total common stock outstanding to 143,750 shares. The Canadian company netted $261,600 in 1958.

► DuPont of Canada Ltd., Montreal, Quebec, has announced in its 1958 annual report that its sales and earnings were higher than those of the preceding year. Net income for 1958 amounted to $5,235,000, equal to 70c per share of common stock.

Ralph E. DeTurk

DeTurk Joins Cooke Color

► Ralph E. DeTurk has joined the technical sales staff of Cooke Color and Chemical Co., Hackettstown, N. J., according to an announcement by Frederick P. Cooke, president of the company. Well known in the rubber and plastics industries, Mr. DeTurk has served in various sales and service capacities with Whittaker, Clark & Daniels in New York, Philip Carey and General Magnesite in Cincinnati and Philadelphia, and with C. P. Hall in Akron. Mr. DeTurk is a director of the New York Rubber Group and holds membership in rubber groups in Philadelphia, Connecticut, Rhode Island and Boston, in addition to New York.

Cooke Color handles a line of masterbatched colors for rubber and plastics and also provides several service functions such as mixing, calendering, etc. The company also produces a cross-linked polyethylene under the trade name of "Polycure." Mr. DeTurk will handle all of these products and services for insulated wire companies and special accounts.

Dayton Develops Airless Tire

► Dayton Rubber Co., Dayton, Ohio, has announced that a safe, blow-out proof, airless tire is being tested by the Freedlander Research and Development Laboratories at American Latex Products Corp., a Dayton subsidiary in Hawthorne, Calif. According to the company, initial tests performed on the experimental prototype indicated that the tire will not deflate even after extensive mutilation. The tire is filled with Polyrubber, a controlled density urethane foam of special formulation, and regardless of the amount of damage to casing or tread, the new type of tire is said to retain its foamed-in-place position and will continue to provide normal support. Inserted in a tubeless tire, the foam forms a permanent bond with both the casing and the metal rim, the company states. The company did not disclose when the new airless tire will be put on the market. Further development testing is planned.

Retires from Farrel-Birmingham

► Austin Kuhns, senior vice-president of the Farrel-Birmingham Co., Inc., Ansonia, Conn., has retired after 36 years with the firm. A registered professional engineer in Connecticut and New York, Mr. Kuhns was graduated from Wesleyan University with a B.A. and from the Massachusetts Institute of Technology with a B.S. degree in chemical engineering. In 1922, he joined the then Farrel Foundry and Machine Co. as a sales engineer and in 1934, he was made executive engineer in charge of marine engineering and sales. Later, he was elected a director and became vice-president in charge of development and research. He became chairman of the finance committee in 1946, serving in that capacity until his retirement. In 1951, he was also named vice-president and consulting engineer and was elected senior vice-president in 1956.

During World War I, Mr. Kuhns was first lieutenant in the Corp of Army Engineers and during World War II, he was in charge of all company work on propulsion gearing for the U. S. Navy and Maritime Commission. He received the Navy Certificate of Commendation in 1947. He has also directed the company's production program for the Atomic Energy Commission and the atomic energy industry. Mr. Kuhns is a member of the American Society of Naval Engineers, American Ordnance Association, Society of Naval Architects and Marine Engineers, Society of Automotive Engineers, Newcomen Society and the National Security Industrial Association.

Elected Vice-President

► Bishop Manufacturing Corp., Cedar Grove, N. J., has announced the election of Raymond J. Love as vice-president. Mr. Love graduated from Virginia Polytechnic Institute in 1941 with a B.S. degree in industrial engineering. Prior to joining Bishop in 1958, he was factory manager of the Pequanoc Rubber Co. He is a member of the labor panel of the American Arbitration Association.

Raymond J. Love

Edward M. Berberian

Joins Columbian Carbon

► Edward M. Berberian has joined the Columbian Carbon Co., New York, N. Y., as a technical representative for its Carbon Black and Pigment Division. He will be located in the New York office and will cover the northern New Jersey territory. Mr. Berberian is a graduate of Brown University with a B.A. degree in chemistry. Prior to joining Columbian, he was in charge of industrial research for the Carpenter-Morton Co. He is a member of the American Chemical Society and president of the New England Paint and Varnish Production Club.

Banbury Temperature Limiter

► U. S. Rubber Co., New York, N. Y., has announced the development of an electronic safety device that automatically shuts off a Banbury Mixer when its internal temperature exceeds a safe limit. The new device, called the "Banbury Temperature Limiter," was developed by the company's Safety and Engineering Departments, working with the Thermo-Electric Co., Inc., Saddle Brook, N. J. U. S. Rubber has already installed over 70 of the safety devices in its various plants. Development of the temperature limiter began shortly after a major fire occurred in one of the firm's plants in 1955, and investigations showed that the fire was the result of human error. The Banbury Temperature Limiter is available to the industry through Thermo-Electric.

Named Rhodia Representative

► Aromatic and Odor Control Division of Rhodia, Inc., New York, N. Y., has appointed Everett J. Weaver as sales representative for the state of Texas. His headquarters will be in Houston, Texas. Prior to his appointment with Rhodia, Mr. Weaver was analytical chemist with Olin-Mathieson and later, chief chemist for the Butler Chemical Co. Mr. Weaver is an active member of the Air Pollution Association in Houston.

Obituaries

L. B. Turner

► L. B. Turner, an expert on polymers and plastics who had been associated with Enjay Co., Inc., New York, N. Y., for many years, died on March 5 while on a business trip to Louisville, Ky. He was 55 years old. Mr. Turner received his bachelor's degree in chemistry in 1928 from the University of Kentucky, where he was elected to Phi Beta Kappa. Subsequently, he earned his master's degree in chemical engineering at Massachusetts Institute of Technology. He had been with Enjay and other affiliates of Standard Oil Co. (N. J.) for 27 years and was associated with the development of polymers and other chemical products for nearly all that time. Mr. Turner was a member of the honorary scientific society, Sigma Xi. He is survived by his wife, one son and three daughters.

Nathan E. Berzen

► Nathan E. Berzen, president of Nat E. Berzen, Inc., New York, N. Y., scrap dealers, died of a heart attack on March 11 in Roosevelt Hospital. He was 80 years old. Mr. Berzen, who attended school in New England, entered the business world 60 years ago. He was a charter member of the National Association of Waste Material Dealers and had served on its Executive Committee. He was also a member of the United Jewish Appeal, having an active interest in civic affairs. Funeral services for Mr. Berzen were held on Friday, March 13, with interment at the Mt. Zion Cemetery in Maspeth, L. I. He is survived by two nephews, Louis Friedlander, who serves as vice-president of the Berzen organization, and M. S. Friedlander, secretary.

Cornelius F. McPhillips

► Cornelius F. McPhillips, an expert on crude rubber, died recently at Presbyterian Hospital, Orange, N. Y., after a long illness. He was 68 years old. Mr. McPhillips served in the General Service Administration of the federal government for 16 years and prior to that was a trader in crude rubber in New York. He retired last November. Surviving are his wife, five sons and a daughter.

Frederick J. Bayme

► Frederick J. Bayme, chemist for the Dryden Rubber Division of the Sheller Manufacturing Corp., Chicago, Ill., died on May 4 at American Hospital. He was 78 years old.

John J. Donleavy

► Dr. John J. Donleavy, former technical director of the General Division of the Allied Chemical Corp., died on April 15, in St. Vincent's Hospital, Montclair, N. J. He was 63 years old. Dr. Donleavy was born in New Haven, Conn., and received a B.A. degree from Yale College in 1916, and M.A. and Ph.D. degrees in organic chemistry from Yale University. In 1917, he became an assistant instructor in chemistry at Yale, was named an instructor in 1919, and assistant professor of chemistry in 1924. In 1939, he joined Allied as manager of its former research plant in Queens, N. Y. He left this post in 1951, becoming general consultant in organic chemistry at the General Division's research laboratory in Morristown, N. J. He was a fellow of the American Institute of Chemists. He is survived by his wife, a son and three daughters.

John T. Kealy

► John T. Kealy, consultant to the Mapico Iron Oxides unit for the Columbian Carbon Co., New York, N. Y., died recently at his home in White Plains, N. Y. He was 61 years old. Associated with iron oxide sales for 36 years, Mr. Kealy started work as a secretary to Norman Lee Smith of Binney and Smith and rose to Mapico iron oxides sales manager. Over the years, Mr. Kealy was active in a number of the trade associations in the paint and rubber fields. He is survived by his wife, two sons and two daughters.

E. H. Schwan

► E. H. Schwan, former manager of national accounts sales for the Goodyear Tire and Rubber Co., Akron, Ohio, died on February 18 at the Clearwater, Fla., Hospital after a long illness. He was 72 years old. Born in Cleveland, where he attended East High School, Mr. Schwan was in sales work with Republic Motor Truck Co., Firestone Tire and Rubber Co., and B. F. Goodrich Co., before he joined Goodyear in 1918. He retired from Goodyear in 1951 after 33 years of service. Surviving are his wife and two daughters.

W. F. Harrah

► W. F. Harrah, honorary chairman of the National Standard Co., Niles, Mich., died recently after an illness of two weeks. Mr. Harrah founded the National Standard Company in 1907, and it has been one of the primary suppliers of bead and hose wire for Akron, Ohio, rubber plants.

Arthur B. Goetze

► Arthur B. Goetze, president of Western Electric Co., New York, N. Y., died on March 9 of a heart attack. He was 57 years old. Mr. Goetze started as a draftsman at Western Electric's Hawthorne Works in Chicago, Ill., 42 years ago. In 1926, he joined the New York headquarters and became assistant superintendent of clerical methods. He was named personnel director in 1942 and between 1949 and 1952, served as a vice-president of the Chesapeake and Potomac Co. in Washington, D. C., and as a vice-president and director of the Ohio Bell Telephone Co. in Cleveland, Ohio, both Bell subsidiaries. Mr. Goetze rejoined Western Electric in 1952 as vice-president in charge of the Kearny, N. J., works and later became vice-president in charge of manufacturing in the Eastern area. He was made a director in 1953, vice-president in charge of finance the next year and president of Western Electric in 1956. Surviving are his wife, a son and a daughter.

David E. Bell

► David E. Bell, chemist and purchasing agent for Harbor Rubber and Plastics, Inc., Long Beach, Calif., died on January 3 at St. Joseph's Hospital in Orange, Calif. He was 64 years old. Mr. Bell first became associated with the rubber industry in the mid-1930's at the Miller Pump Co., where he worked until 1944. He then served with the Patterson Ballagh Corp. for one year before joining Harbor Rubber & Plastics, Inc., where he served until his death. Mr. Bell was a member of the Los Angeles Rubber Group, Inc., for many years. He is survived by his wife, one daughter and one son.

Sir George Beharrell

► Sir George Beharrell, former head of the Dunlop Rubber Co. in England, died on February 20 at his home in Harpenden, England. He was 85 years old. Sir George was appointed managing director of Dunlop in 1923 and later became chairman and then president of the firm. At the outbreak of World War I, he joined the Civil Service as a transportation expert and helped to form the Ministry of Transport in 1919. That year, he was knighted for his war services.

Raymond L. Wetzel

► Raymond L. Wetzel, director of advertising and public relations for the Dayton Rubber Co., Dayton, Ohio, until his retirement a year ago, died of a cerebral hemorrhage at Miami Valley Hospital on March 1. During his 33 years with Dayton, Mr. Wetzel assisted at the launching of many of the company's products including printing rollers, V-belts and foam rubber. He is survived by his wife and two daughters.

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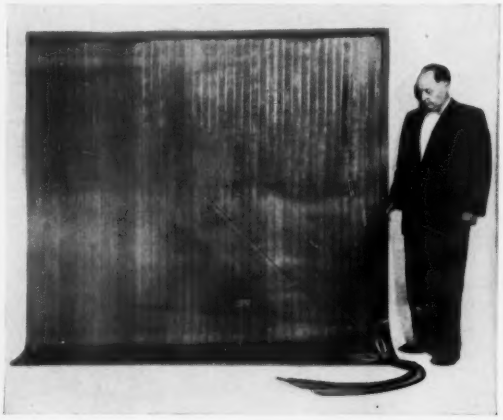
New Goods

Briscoe Heating Blanket

► Briscoe Manufacturing Co., 1055 Gibbard Avenue, Columbus, Ohio, has developed a silicone rubber imbedded heating blanket for industrial uses. The blanket, called "Briskeat SRE", is fabricated in flat or contoured form to customers' requirements and specifications. Each blanket represents a complete integral electrical



heating system. According to Briscoe, special reinforcements, hardware and thermal sensing devices may be integrally molded onto the blanket as required. The outstanding properties of the blankets are said to be excellent durability, ruggedness, flexibility and thermal efficiency.

Briskeat SRE blankets are recommended for use in the curing of large reinforced plastic structures and bonding of sandwich constructions, and are suited for field repair work. Other applications include temperature stabilization of large equipment or enclosures and heat conditioning of large sheet metal parts prior to forming, the company states. The blanket comes in any size, has a weight of approximately one pound per square foot, a thickness of 7/64 inch, has a maximum watt density of 10 watts per square inch, has an intermittent operating temperature of 550°F. and a continuous operating temperature of 500°F., and can utilize any voltage or phase within watt density range.

Warm-Flor Car Heating Pad

► Warm-Flor Division, P.O. Box 4331, Hamden, Conn., has manufactured a heating pad for cars which operates under the floor pad and is powered by the ignition system. Neoprene sheets protect the heating element and neoprene adhesives hold resistance wires firmly in place. With a standard 12 volt current, the pad heats to 160° F.

Flexible Rotary Hose

► B. F. Goodrich Industrial Products Co., a division of B. F. Goodrich Co., Akron, Ohio, has announced the availability of a flexible, slim hole rotary hose that won't "kink off" or collapse in service. The company furnishes its new "Commander" hose with an exclusive reattachable coupling that enables hose to be recoupled in the field simply and quickly, using only a vise and wrench. Reinforced with more than 10 miles of high tensile strength, heavy steel wire in every 50 foot length, Commander hose is designed especially for slim hole drilling and for use on portable drilling rigs, workover rigs, seismograph and geophysical rigs, the company reports. Three braids of multiple-end wire are braided at a precise angle to resist changes in hose length or diameter during high pressure applications. Wire braids are cushioned in oil-resisting rubber. While engineered for working pressure up to 1,000 pounds per square inch, each length of Commander hose is tested to 2000 pounds and has a minimum burst of 4000 pounds per square inch, the company reports.

Shure-Drive Shock-Absorbing Hammer

► A hammer which absorbs much of the impact shock has been introduced by Ramset Fastening System, Olin Mathieson Chemical Corp., Cleveland, Ohio. The head of the hammer is not rigidly connected to the hammer handle but is suspended from it by elastic shocks within the head

housing. These shocks, or O-rings, are made of a resilient rubber material. It is by suspending the hammer head that impact shock is minimized. The new hammer is called "Shure-Drive" and, according to the company, it will find greatest acceptance among professional workers, such as plumbers, carpenters, masonry contractors, electricians, sheet metal contractors, display builders, plasterers, lathing contractors, heating contractors, alteration contractors and automotive body repair shops.

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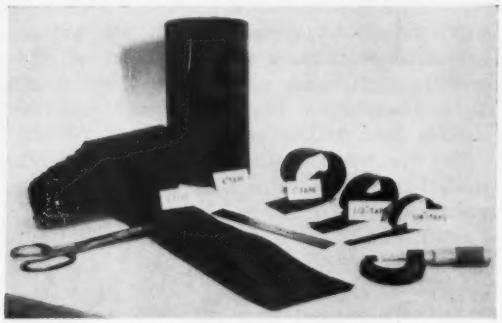
Sunelec Flexible Heating Tape

► A new type of flexible heating tape which is said to conduct electricity without wires, can be cut to any desired length and maintain a uniform temperature at any spot on its surface, is commercially available from Sunelec, Inc., Box 1139, Trenton, N. J. The tape is made of woven glass



fibers impregnated with conductive silicone rubber. It is available in widths of from ½ to 6 inches and thicknesses from .005 inch to .012 inch, in any desired length. According to the company, tests of the Sunelec tape have shown that it could stand continuous temperatures as high as 400°F., and for short periods it could stand 600°F. Because it contains silicone rubber, the tape does not become brittle at very low temperatures, as is the case with objects made with the organic rubbers, the company states.

Heavy Duty Force Cup

► The "Professional," a new heavy duty force cup for the master plumber as well as home owner has been introduced by the Lee Rubber & Tire Corp., Conshohocken, Penna. The Professional combines, in one cup, all the features of a working plumber's tool. Its large capacity bell-shaped bowl provides powerful suction for cleaning stubborn drains. The stepped down sidewall permits the cup to be wedged tightly into the toilet bowl for a positive seal. It is supplied with a sturdy handle that threads deeply and securely into the cup-socket. The cup itself is made from quality rubber compounds for maximum resiliency and is available in a choice of black or red rubber.

Fluorescent Colored Balls

► Barr Rubber Products Co., Sandusky, Ohio, has introduced its "Flame" line of basketballs and playballs. According to the company, Flame has vivid "Day-Glo" fluorescent pigment colors which immediately catch and hold the eye. The balls are available in red, orange and green, and in 7½ inch and 9½ inch diameters. Flame balls are in pebble or panel finish and include a re-inflating valve, the company states.

THE CASE OF THE
Listening Lady
SOLVENT CONTAMINATION AND LATE DELIVERY HAVE COST US A 9% LOSS IN PRODUCTION . . . I'LL GIVE YOU ONE MORE CHANCE!!

EXCUSE ME, MR. JONES . . . I HAPPENED TO OVERHEAR THE BOSS, AND . . . WELL, I HAVE AN IDEA . . .
PURCHASING AGENT
. . . AND MY BROTHER SAID SWITCHING TO SKELLYSOLVE WAS THE ANSWER FOR THEM!!
SKELLYSOLVE EH? BY GOLLY, IT'S WORTH A TRY.
LATER
LOOK AT THESE FIGURES, JONES . . . PRODUCTION'S WAY UP!! HOW'D YOU DO IT?
. . . AND SINCE SKELLYSOLVE IS CONSTANTLY CHECKED DURING PRODUCTION AND BEFORE SHIPMENT NO MORE CONTAMINATION TROUBLES!
NINE OUT OF TEN CARS ARE SHIPPED THE DAY AFTER THE ORDER IS RECEIVED . . . AND THEIR TECHNICAL SERVICE IS BACKED BY OVER 25 YEARS EXPERIENCE!
NICE GOING, JONES!!
FLOWERS . . . FOR ME?
SURE, AND I'M RECOMMENDING YOU FOR A RAISE!! THANKS FOR TIPPING ME OFF TO SKELLYSOLVE!!

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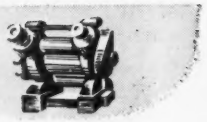
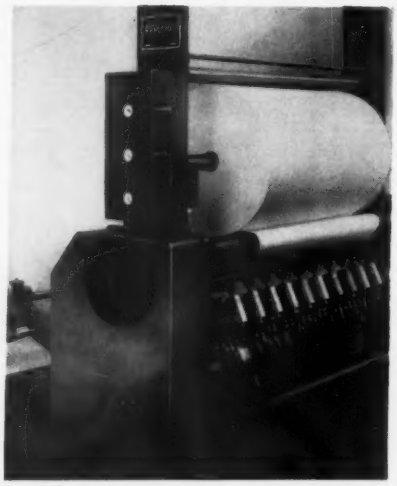
New Equipment



Doven Drum Winder and Slitter

► Doven Division, Appleton Machine Co., Appleton, Wisconsin, has announced a new score or shear cut slitter. Called Model SR-60, the machine is designed to cut rubber, sponge rubber and other materials as narrow as a quarter an inch.



Web sizes vary from 36 to 125 inches in width The standard model will take parent rolls up to 48 inches in diameter; optional equipment increases the capacity to 60 inches. One of the available features is said to permit an inexperienced operator to reassemble the cutter blades to .001-inch tolerance, no matter how many times they have been ground. Air operated cutters, which allow for simplified adjustment to insure equal pressure at all points while operating, are another feature. The slitter can be equipped with virtually any type of electrical or mechanical drives for a variety of applications.

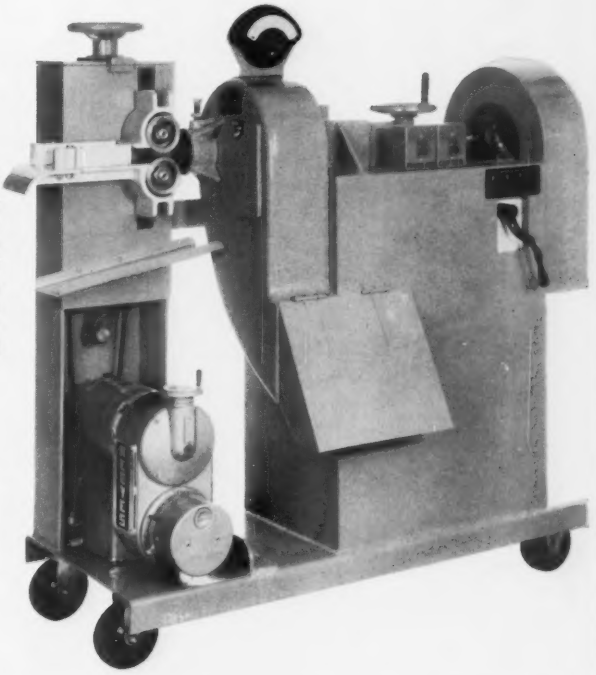
Wink Metering Unit

► Motch & Merryweather Machinery Co., 1250 E. 22nd St., Cleveland 17, Ohio, has introduced a new metering unit to control cutting length on its cutting machines. The device features a large, easy-reading dial, graduated in feet and inches. A separate scale for each of three length ranges is provided. Length selection is said to be quick and precise by use of a hand crank. Backlash is automatically compensated for, and length changes may be made while the machine is either in operation or idle. Standard cutting capacity is from ½ to 60 inches, though almost any desired range is available.

New Gear Shift Model . . . Heavier Construction, Faster Size Changeovers!

GOODMAN
RUBBER
SLUG CUTTER

Size changeovers are faster than ever with the new Gear Shift Model Goodman Slug Cutter. Heavier (2390 lbs.), more rugged construction assures greater accuracy of slug weight during continuous production. Delivery rate increased to 50-1200 slugs per minute. Two models . . . with choice of slug lengths 3/16″ to 4″, or 3/16″ to 12″. Easily moved on swivel caster base, unit occupies only 60″ x 32″ floor space. Stock capacity up to 3″ dia., variable speed 180-1800 in./min.



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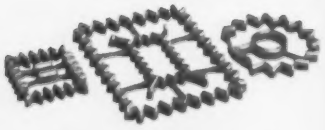

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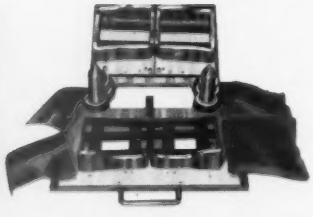

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Falls Engineering Roller Die Cutter

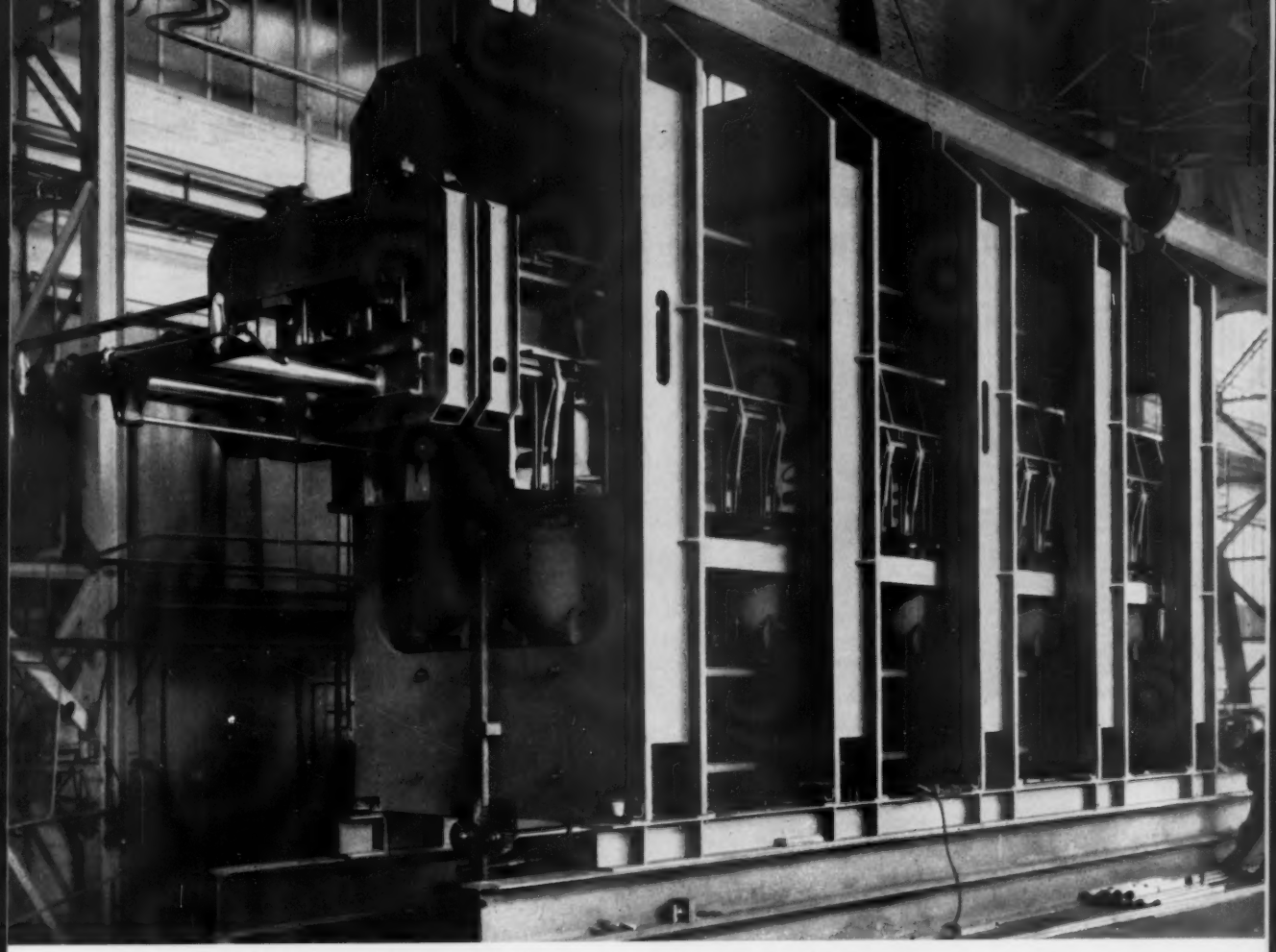
► A new model 60 x 48-inch heavy duty roller die cutter which offers both horizontal and vertical die handling mechanisms has been announced by Falls Engineering and Machine Co., Cuyahoga Falls, Ohio. A complete cutting impression every ten seconds is possible with the machine, according to the manufacturer. Chief advantage of the

vertical die handling mechanism is that it precompresses and registers the stock before the roller starts the cutting action. This practically eliminates such difficulties as stock distortion and stretch, producing instead what the designers call a "straight side" cut with true vertical edges. Other advantages are that it will cut heavy gage stock and that it leaves all of the bed cutting area available for multiple die set-ups.

The horizontal die handling mechanism automatically moves the dies on and off the die cutter bed plate. The cutting action is not directly against the roll but against a facing of stainless steel. After the lower frame and dies move onto the bed, the vertical handler frame closes with the cutting plate over the material, and the roll passes over the back of the plate, forcing the material into the die cavities. Operations are automatic from the time the stock is positioned until the multiple cavity die-cut pieces are dumped into a tote box by inverting the lower die frame. The manufacturer points out that scrap loss on any multiple cavity die cutting job may be predetermined and the scrap can be accurately figured into the cost of production.

Vanton Plastic Strainers

► Vanton Pump & Equipment Corp., Hillside, N. J., has announced a complete line of PVC plastic strainers designed to trap particles that would be hazardous to the internal moving parts of process equipment. The units are constructed entirely of polyvinyl chloride. Sizes range from ½ through 2-inches with either socket weld ends for solvent weld connections or molded thread ends.



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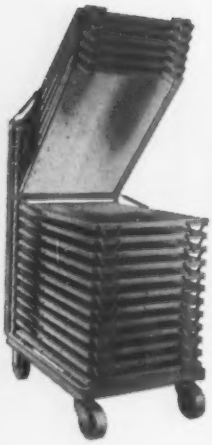
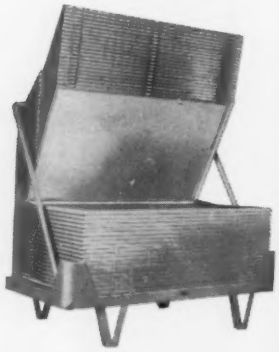
are cutting costs throughout the Tire and Rubber Industry





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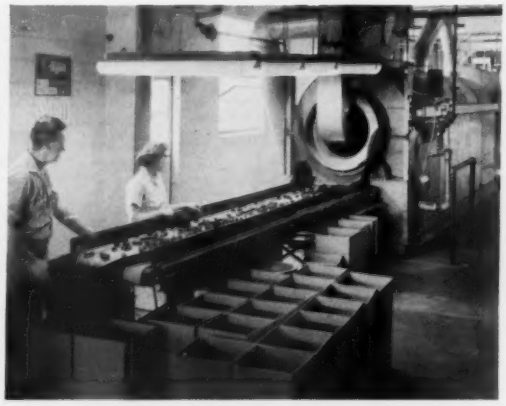
Molded Parts Cleaning Machine

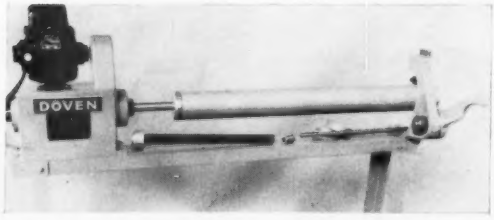
► A four-stage drum type machine developed for cleaning and processing molded rubber parts by chemical and mechanical action handles solutions by dip cups which eliminates the need for solution



pumps. Manufactured by Ransohoff Co., Hamilton, Ohio, the machine is designed to immerse the parts in various solutions in the drum sections, thoroughly cleaning and processing them. Mechanical action is effected by the cascading of the work in the drum when it rotates. Operation of the machine is completely automatic. Over-all dimensions are 24½-feet in length, 5-feet in width and 9½-feet in height. The drum is 36-inches in diameter and 25-inches in length. Gas heat is used for all tanks and drying air. Production is rated at 10,000 to 12,000 pounds of mechanically molded parts per eight hour period, including up to eight size changes.

Appleton Portable Core Cutter

► A new portable core cutter designed to slice various sizes and diameters of tubes into a variety of core lengths has been announced by Doven



Division, Appleton Machine Co., Appleton, Wisc. The standard model can handle cores of one-inch to eight-inch inside diameter, and can slice them into half-inch widths using tubes up to 80 inches in length. Larger and smaller units are available.

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FINISHED PRODUCTS made from ADIPRENE L urethane rubber are superior to conventional materials of construction in many ways. ADIPRENE L pump impellers like this one have handled more than 380,000 tons of solids in the form of an abrasive acid slurry without replacement. Normal life expectancy for similar impellers made of other materials is only 170,000 tons of slurry.

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Hardness, Shore A	88	95	97	99+
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Modulus, 300%, psi	2100	3200	7000	–
Tensile Strength at Break, psi	7000†	8825†	8500†	8500†
Elongation at Break, %	450	480	340	250
Split Tear. ASTM-D 470 lbs./linear inch	50	155	160	200
Compression/Deflection, psi @ 5% defl.	275	375	650	1400
Rebound Resilience, %	45	40	42	45
Oil Resistance	Excellent	Excellent	Excellent	Excellent
Low Temperature Brittle Point, °F.	<-80	<-80	<-80	<-80

*Softer compounds ranging from 10 Shore A are also available
†Samples pulled @ 1"/minute (elastomer stocks normally pulled at 40"/min.)

. . . two new ADIPRENE® L liquid urethanes offer you new processing opportunities

Two new and important additions have been made to the Du Pont family of ADIPRENE L urethane elastomers. New LD-167 and LD-213 polymers, now under development, can be cured to hardness as high as *78 Shore D.* Yet they remain resilient . . . elastic . . . provide exceptionally high load bearing capacity and abrasion resistance.

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In cured form, LD-167 and LD-213 can be machined on standard metal working equipment. Their vulcanizates are resistant to radiation, oxygen, ozone, oil, grease, many chemicals and solvents. In addition, they resist embrittlement at temperatures below –80° F.

Get complete information about the newest members of the ADIPRENE L family. Trained Du Pont personnel are available to help you evaluate these new materials. Write for complete technical data to E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Department RA-6, Wilmington 98, Delaware.

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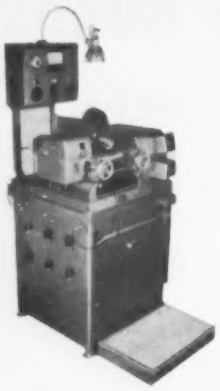

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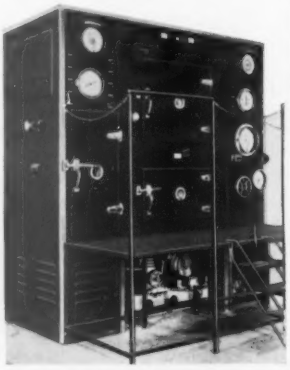

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Overseas

Tehran—A recently organized subsidiary of the B. F. Goodrich Co. will construct a new tire and tube plant in Tehran, Iran. The 130,000 square foot plant, which will be built on a 40 acre tract adjoining the main line of the Iranian National railroad, is scheduled for completion early in 1961. A group of Iranian investors are associated with Goodrich in the new company.

London—DuPont Co. (United Kingdom) Ltd. has opened a new laboratory, located in the vicinity of London, for development work on neoprene and other synthetic rubbers and rubber chemicals. Designated the Elastomers Research Laboratory, the facility is the first permanent unit to be completed by DuPont in Europe.

Milan—Polymer Co. of Italy, an associated firm of Montecatini, will begin commercial production of polypropylene textile fibers in Italy at the end of this year. Based on the discoveries of Professor Giulio Natta (Polytechnic Institute of Milan) in the field of stereospecific polymerization of alpha-olefins, the new isotactic polypropylene textile fiber is obtained from propylene gas, a petroleum by-product. Initial price on the Italian market is expected to be approximately 60c a pound.

The Hague—Continental Carbon Co. plans to construct a carbon black plant in Rotterdam, the Netherlands. The unit is expected to cost about $2.5 million and will have an initial capacity of 15,000 tons of high abrasive carbon black. Construction will start immediately with completion scheduled for early 1960.

New Delhi—The government of India will furnish plans for construction of a synthetic rubber plant in which it will hold majority ownership. Consumers such as Goodyear, which will be technical consultant, and Firestone are expected to buy some shares in the newly formed company. To have a 20,000 ton annual capacity, the plant is expected to be in full production by 1961.

Johannesburg—A plant to manufacture oil carbon black will be constructed in the Union of South Africa by a new company to be known as Phillips Carbon Black Co. (Pty.) Ltd. The firm will be equally owned by the Phillips Petroleum Co. and the Industrial Development Corp. of South Africa Ltd.

London—Union Carbide Corp. plans to augment its polyethylene facilities at Grangemouth, Scotland, with a 30 million pound per year production unit. The new installation is expected to be in production by 1960.

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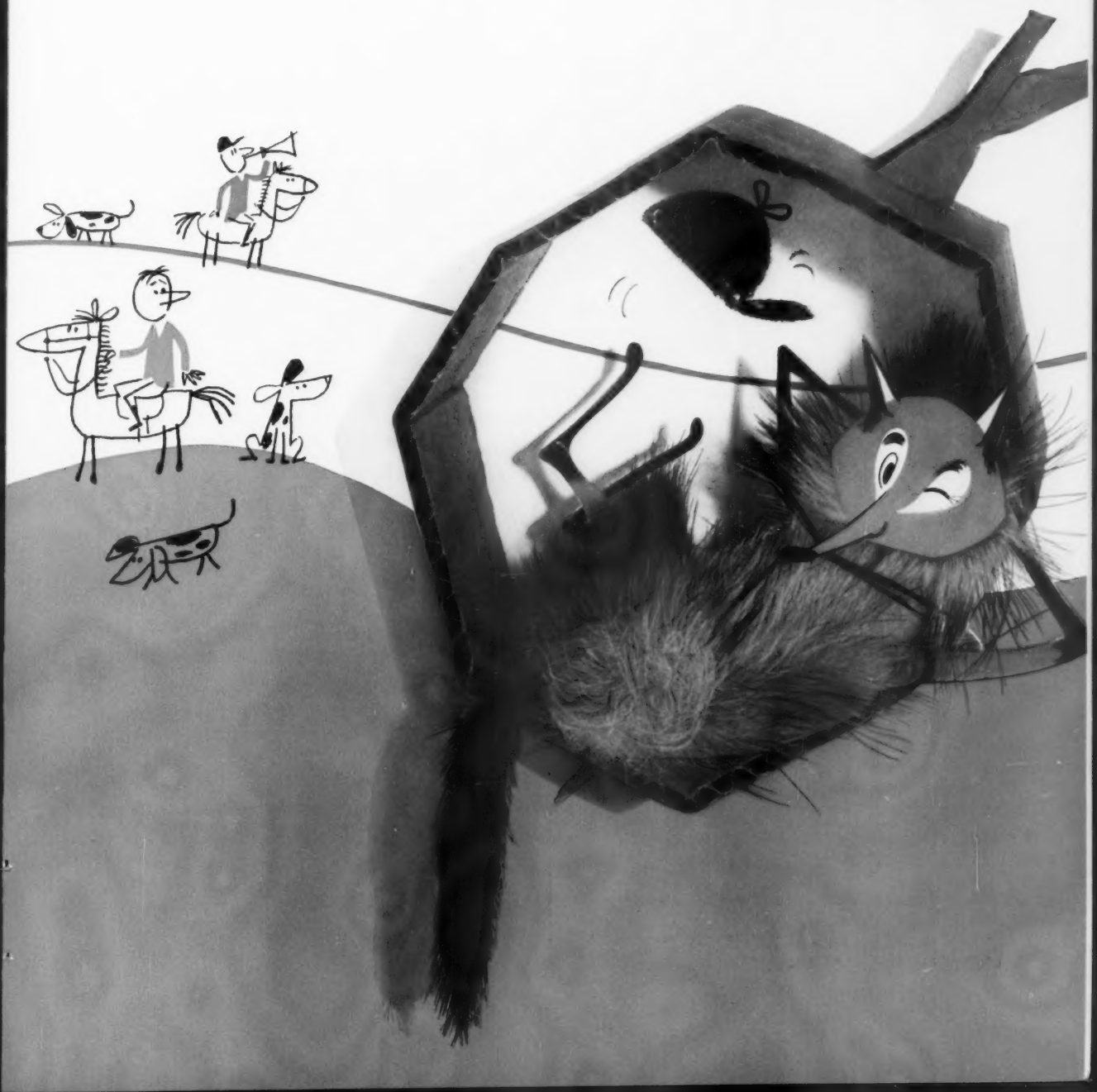

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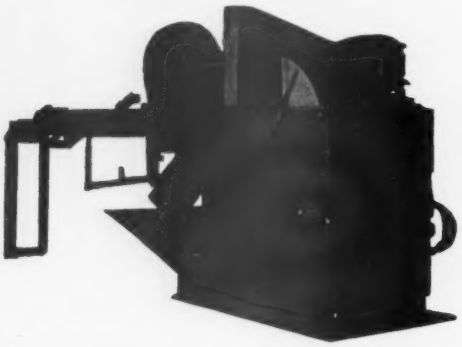

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Reviews

Engineering Materials Handbook. Edited by Charles L. Mantell. Published by McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York 36, N. Y. 6 x 9¼ in. Approximately 2000 pp. $21.50.

The authors of this book total over 150 specialists in various fields. The purpose of the book is to supply the practicing engineer, designer, student or purchasing agent with an authoritative reference work on engineering materials. The volume opens with a list of abbreviations, and chapters on properties of materials and processing techniques (including compression molding and extrusion operations). It then continues with 39 additional chapters on various materials, and closes with two chapters on materials problems of specific industries and sources of information. An extensive subject index follows the text.

The section on rubbers and elastomers is a small technical encyclopedia of our basic raw material. Written by Floyd S. Conant and George L. Hall of Firestone's Chemical and Physical Research Laboratories, it is divided into parts on elastomer types, rubber processing, rubber as an engineering material, stress-strain relationships and specific properties and tests of rubber. Each of these followed by a list of literature references.

Within a limited space the authors have done a remarkable job in presenting the essence of rubber technology. It is difficult to believe that so complex a subject could be explained satisfactorily within the limitations imposed by the format of the book, but the writers have produced an admirable survey of their subject. The reader puts down the volume fully satisfied with the depth of the treatment of our unique science-art.

Besides the chapter devoted exclusively to elastomers, many allusions are made in other chapters to rubbers—as, for example, in reference to hose in the part on "Pipe, Fittings and Valves," and to adhesives in the section on that subject. The reader will find a wealth of data in this volume, much of which relates to his needs in a direct way even though not within the elastomers chapter. The subject index makes location of the material a simple operation.

•

Statistical Quality Control: An Introduction for Management. By D. H. W. Allan. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 5 x 7½ in. 130 pp. $3.50.

Statistical quality control is becoming an increasingly important factor in manufacturing processes in this day when the demands for service life of products under specified conditions are becoming more severe, and the costs of replacing unfit goods higher. This book has been written for the executive who desires a working knowledge of this new management science without the necessity of considering the mathematical details of its practice.

The first two chapters answer the questions what is statistical quality control, and how does it fit into an organization. The next four chapters acquaint the reader with the basic SQC tools and where they are applied.

The seventh chapter deals with the statistical methods used for investigations and experiments describing their application and limitations. The last chapter is composed of lists of reading sources for the reader interested in pursuing further this modern management tool.

This volume is one of a series being prepared by the publisher on management science. It is a worthy offering to those who realize that successful commerce depends on proper management of goods and people.

BOOKLETS, CATALOGS, etc.

Basic Properties of Aluminum Silicate Pigments (ASP's). (Technical Information Bulletin No. 1001). Minerals & Chemicals Corp. of America, Essex Turnpike, Menlo Park, N. J. 8½ x 11 in. 4 pp.

The basic properties of a line of aluminum silicate pigments, non-hygroscopic mineral products recommended for use in rubber and many other industrial applications, are described in this bulletin. Twelve series of products are presented, with data, provided in tabular form, giving both physical and chemical characteristics. Particle size of each series is shown graphically. Three of the series, which possess very high whiteness and excellent extrusion properties, are especially recommended for rubber.

•

Diatomaceous Earth. By William Q. Hull, Harvey Keel, John Kenney, Jr., and Bernard W. Gamson. Dicalite Division, Great Lakes Carbon Corp., 18 East 48th St., New York 17, N. Y. 8 x 11 in. 18 pp.

This booklet, a reprint of an article from *Industrial and Engineering Chemistry*, is a basic treatise on diatomaceous earth. The processing of this material, valuable as a filler for rubber and for many other industrial applications, from mining to finished product, is described in detail. Extensive market and end-use data are also given. Numerous photographs of the machinery and installations and schematic diagrams of the processing operations enhance the presentation. A well designed and written booklet on an interesting subject.

•

The Portable Elevator for Vertical Material Handling. Association of Lift Truck and Portable Elevator Manufacturers, One Gateway Center, Pittsburgh 22, Penna. 8½ x 11 in. 20 pp.

This booklet presents in complete detail exactly what the portable elevator is and illustrates its advantages and applications for vertical material handling. Helpful data on how to select a portable elevator, as well as a review of the various types, are given. The booklet also offers basic information on lifting-lowering mechanisms, sources of power, lifting-lowering carriage variations, and outlines several other special features of the portable elevator. One page is devoted to the interesting 92-year history of portable elevators.

•

Specifications and Characteristics of Organic Chemicals. Emery Industries, Inc., Department 5, Carew Tower, Cincinnati 2, Ohio. 8½ x 11 in. 4 pp.

This catalog lists product designations, descriptions and specifications for the Emery line of organic chemicals. Included in the materials are dibasic acids, low molecular weight fatty acids, lubricant esters, fatty acid esters, plasticizers and others. Tables are used to portray the relevant chemical and physical data. New products, added since publication of the previous catalog, are included for the first time.

•

Enjay Butyl—The Versatile Modern Rubber. Enjay Co., Inc., 15 West 51st St., New York 19, N. Y. 8½ x 11 in. 12 pp.

This catalog describes Enjay butyl rubber, giving a comprehensive listing of applications, as well as charts, and graphs to show the product's weathering and sunlight resistance, chemical and solvent resistance, heat and age resistance, impermeability to gases and excellent electrical properties. The extensive data on physical properties is portrayed by tables and graphs, many of which make comparative evaluations with other polymers. Photographs are used to portray end applications.

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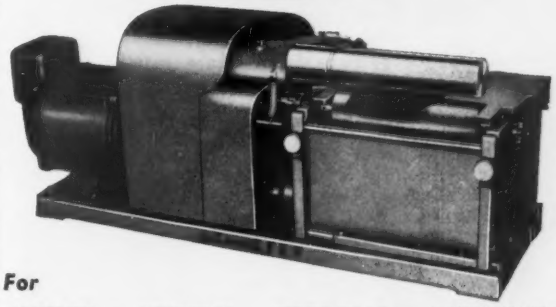

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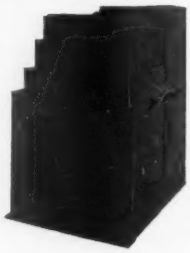
Comes in two sizes designed to handle sheets up to 7" or 14" in width. Other sizes made to order.

Input speeds range from 10 to 125 feet per min. depending on material and size of cube desired.

The CUMBERLAND Rotary Chopping and Dicing Machine

As a chopper, this machine efficiently cuts rubber and vinyl slabs into small pieces. Two sizes available to handle stock widths up to 14 or 24 inches.

As a dicer in modified form, handles principally vinyl sheet stock. A less expensive machine though less universal than the "Stair-Step" Dicer shown above.



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Factbook for Selecting and Installing Quad-Ring, O-Ring Seals, and Kapseals. Minnesota Rubber Co., 3630 Wooddale Ave., Minneapolis 16, Minn. 8½ x 11 in. 24 pp.

The new expanded edition of this booklet provides rubber buyers and engineers much useful information on O-rings, including the size numbers and dimensions of all common industrial O-rings and the Minnesota Rubber Quad-Ring. The sizes are cross-indexed for comparison with many of the commonly used dimensional specifications. It also gives practical tips for the installation of the different seals. Information about media in which various rubber compounds can be used and many other useful facts concerning rubber are also given. The last section of the booklet, devoted to a description of Kapseal, a Teflon boot which is used with O-rings, includes size charts and installation guides.

•

Selecting Instruments to Solve Your Analytical Problems. Perkin-Elmer Corp., Norwalk, Conn. 11 x 8½ in. 20 pp.

This brochure discusses the applications of instrumental analysis and its advantages. It specifically tells how and why infrared and ultraviolet spectrophotometers and gas chromatography instruments are employed and the benefits obtained with them. Typical spectra and instrument schematics are used in telling the story. The bulletin gives details of the complete Perkin-Elmer line of analytical instruments and accessories, and their applications. It also discusses briefly how infrared and gas chromatography can be used in conjunction to obtain a complete analysis.

•

Silicones in Missile Design. Dow Corning Corp., Midland, Mich. 9 x 11¾ in. 8 pp.

This bulletin supplies information on silicone materials for use in rockets. It is divided into sections on rubbery materials; rigid materials; dielectric materials; and fluids, greases and related materials. The part on rubbery materials gives information on the physical properties and age and weather resistance of Silastic silicone rubber and Silastic RTV, a silicone rubber that vulcanizes at room temperature. Tapes made from the silicone rubber are also described. Photographs and schematic diagrams show applications in rocket construction.

•

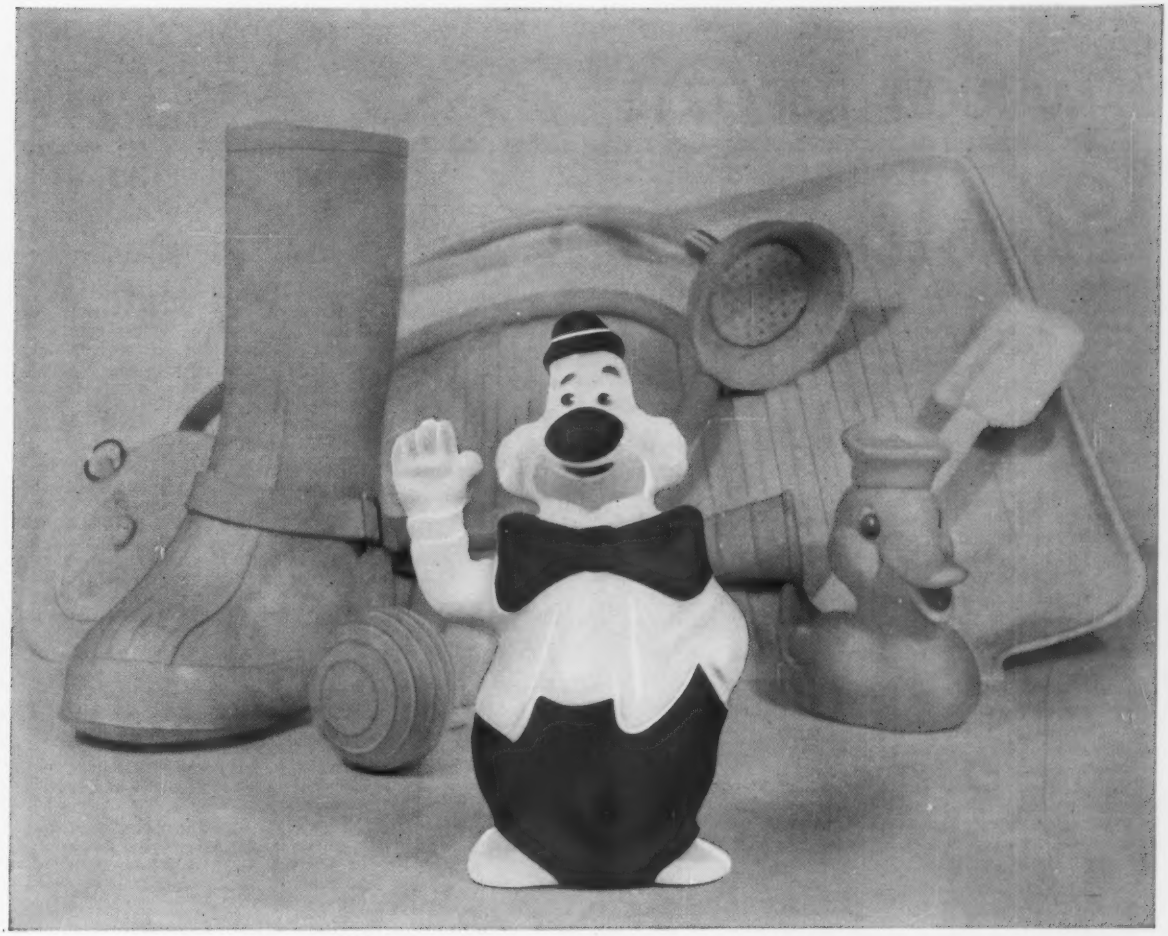
Garlock Expansion Joints and Flexible Couplings. (Bulletin AD-137). Garlock Packing Co., 433 Main St., Palmyra, N. Y. 8½ x 11 in. 12 pp.

Natural rubber, neoprene and Teflon-lined expansion joints, their construction, sizes and uses, are fully explained in this bulletin. The characteristics and limitations of seven styles of expansion joints and flexible couplings are given. Photographs and schematic diagrams illustrate the various units, and such information as dimensions and pressure and temperature limits is given in tabular and graph form. Ordering information is specified.

•

Heavy Duty Knife Cutters. (Bulletin No. 213). Sprout, Waldron & Co., Inc., 130 Logan St., Muncy, Penna. 8½ x 11 in. 4 pp.

This bulletin illustrates and describes a full range of cutters for a variety of industrial uses such as hogging rubber and granulating thermoplastic stock. Complete construction details are given for three models. Engineering drawings, a table of specifications and close-up photographs of major design components are included. The bulletin presents a complete picture of the machines and their operating capacities and uses.



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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (May 1), the price of natural rubber on the New York Commodity Exchange has moved in a range of 225 points, high for the period being 37.28c reached on May 7 and 22, and low being 35.13 reached on May 29. The average price of spot rubber for the month of May was 36.48c based on 21 trading days. This compares with an average of 33.72c in April.

The rubber market broke sharply in the latter part of the month prompted, in part, by intimation of changes in stockpile procedure and by rubber purchasing practices by the Red Chinese.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that buying of nearby rubber has been persistent and futures have established an unquestioned discount market. U. S. consumers are actively buying physicals for delivery through July.

The lower grades in the physicals market have been firm to the point that sellers in some cases have had to deliver higher grade rubber. This narrowness of rubber spreads is usually one of the most significant barometers of a firm market.

China-Ceylon Arrangement

Reports from Ceylon state that an agreement has been reached in which Red China will supply Ceylon with 250,000 tons of rice in exchange for 30,000 tons of rubber in 1959. The price for rice from China will be based on the price agreed to by Burma for deliveries to Ceylon and will be worked out so that the landed cost of rice in Ceylon is roughly the same for both Chinese and Burmese rice. A firm agreement on the tentatively agreed upon barter is expected to be signed shortly.

Members of the Malayan rubber industry have charged that China has been stockpiling rubber with the idea of breaking the market at some later date. The Chinese are now said to be planning important Indochinese purchases.

The probable change of markets for the Chinese is believed to have serious political implications. Singapore general elections were to have been held at the end of May. Curtailment of Chinese purchases from that quarter might lead to influence the outcome of the elections.

Rubber has now become an important political consideration in the Far East. Always a vital economic factor and to some degree a political manifestation, rubber has now moved to the forefront as a cold war weapon. Since the basic economies of various Far Eastern countries hinge upon rubber, the importance of the Chinese moves cannot be over-estimated either politically or economically.

NEW YORK, JUNE 1, 1959

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MAY 1 TO MAY 31

May	Spot	July	Sept.	Nov.	Sales
1	35.85	35.85	35.80	35.60	122
2	....	....	....	....	...
3	....	....	....	....	...
4	36.13	36.35	36.25	35.80	150
5	37.00	37.20	36.90	36.45	152
6	36.75	36.80	36.50	36.25	150
7	37.38	37.45	37.15	36.90	195
8	36.50	36.35	36.10	35.80	357
9	....	....	....	....	...
10	....	....	....	....	...
11	36.25	36.20	36.00	35.65	130
12	36.75	36.65	36.40	36.20	162
13	36.25	36.10	35.70	35.45	186
14	36.00	35.90	35.50	35.05	132
15	35.75	35.75	35.31	34.80	40
16	....	....	....	....	...
17	....	....	....	....	...
18	35.88	35.90	35.40	34.80	18
19	36.25	36.20	35.75	35.35	72
20	37.00	36.90	36.15	35.80	58
21	37.00	37.00	36.10	35.65	70
22	37.38	37.30	36.50	36.15	82
23	....	....	....	....	...
24	....	....	....	....	...
25	37.25	37.01	36.30	35.95	58
26	37.00	36.85	36.15	35.75	49
27	36.75	36.65	36.00	35.70	44
28	36.00	35.75	35.25	34.90	126
29	35.13	34.75	34.45	34.10	210
30	....	....	....	....	...
31	....	....	....	....	...

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.35⅝
July	.35½
Aug.	.35⅜
Thin Latex Crepe:	
Spot	.37¼
Thin Brown Crepe, No. 2	.35⅛
Flat Bark Crepe	.30½

London Market
(Standard Smoked Sheets)

July	33.69 — 33.98
Oct.-Dec.	33.83 — 34.13

Singapore Market
(Standard Smoked Sheets)

July	32.46 — 32.54

Middling Upland Quotations

	Apr. 30	May 29		
	Close	High	Low	Close
July	35.10	34.70	34.64	34.64
Oct.	32.77	32.65	32.61	32.60
Dec.	32.69	32.64	32.61	32.60

Notes & Quotes

Tire industry sales in 1959 will surpass the all-time high established in 1955, according to E. F. Tomlinson, president of the B. F. Goodrich Tire Co. He estimates that industry sales in 1959 will total 115,345,000 pneumatic tires of all types, compared with 105,040,000 in 1958. In 1955, the industry sold 114,244,000 tires. A big factor in the increasing tire market is the steady growth in the number of multiple-car families, he said.

Synthetic Rubber

Strikes at several major rubber plants made themselves felt as consumption of new rubber in the United States for the month of April declined to 118,020 long tons, compared with the 147,080 long tons consumed during March. However, the April, 1959, figure was still above the April, 1958, figure of 103,742 long tons.

Consumption of all types of synthetic rubber in April amounted to 77,170 long tons compared with March's consumption of 95,089 long tons. The ratio of synthetic rubber to total new rubber reached a new high level with an April figure of 65.39 per cent contrasted with the March ratio of 64.55 per cent. A first-four-month ratio of 64.76 per cent was established for 1959 against 63.86 per cent for the same period in 1958.

Natural rubber prices, at this writing, are hovering close to the 36c per pound mark. If these prices are maintained for the next month or two, the ratio of synthetic rubber consumed to total new rubber may establish a new high within the next several months.

It should be remembered that the synthetic rubber industry has a capacity to produce which is greater than any probable demands which will be made upon it this year.

It should also be remembered that the natural rubber industry is operating at full capacity. All the natural rubber which will be produced this year will be consumed. Many in the trade foresee a probable natural rubber shortage this year.

Effects of Strike

The strike which hit many major consumers in the United States has served to curtail natural consumption as well as synthetic consumption. In April, 1959, for example, 40,850 long tons of natural were consumed compared with the 51,991 long tons consumed in March, a percentage drop of more than 20 per cent.

In April, 1959, 77,170 long tons of synthetic were consumed against the 95,089 long tons consumed in March, 1959, a drop of less than 19 per cent.

Now this percentage drop of a little more than 1 per cent in favor of synthetic rubber may not be great, but it may be indicative of the way the wind is blowing.

It is interesting to note that as a result of the strike, reclaimed rubber consumption fell by only 15 per cent. All this tends to reinforce the feeling held in some quarters that natural rubber, with a percentage consumption drop of more than 20 per cent, has indicated the delicacy of its position, and that this works to the benefit of synthetic.

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Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900 [1]
Butaprene NH	.6500 [1]
Butaprene NL	.5000 [1]
Butaprene NXM	.5800 [1]
Chemigum N1NS	.6400 [2]
Chemigum N3NS	.5800 [2]
Chemigum N5	.5800 [2]
Chemigum N6	.5000 [2]
Chemigum N6B	.5000 [2]
Chemigum N7	.5000 [2]
Chemigum N8	.5000 [2]
Chemigum N600	.5000 [2]
Herecol N-33	.6800 [2]
Hycar 1001	.5800 [2]
Hycar 1002	.5000 [2]
Hycar 1014	.6000 [2]
Hycar 1041	.5800 [2]
Hycar 1042 and 1043	.5000 [2]
Hycar 1051	.5800 [2]
Hycar 1052	.5000 [2]
Hycar 1053	.5000 [2]
Hycar 1072	.6400 [2]
Hycar 1203	.4600 [2]
Hycar 1312	.5000 [2]
Hycar 1411	.6200 [2]
Hycar 1432	.5900 [2]
Hycar 1441	.6200 [2]
Paracril AJ	.4850 [2]
Paracril ALT	.5000 [2]
Paracril B and BJ	.5000 [2]
Paracril BLT and BJLT	.5000 [2]
Paracril C and CLT	.5800 [2]
Paracril CV	.5900 [2]
Paracril D	.6500 [2]
Paracril 18-80	.6000 [2]
Paracril OZO	.4600 [2]
Polysar Krynac 800	.5000 [1]
Polysar Krynac 801	.5800 [1]
Polysar Krynac 802	.5000 [1]
Polysar Krynac 803	.5000 [1]

Butadiene-Styrene Types

Ameripol 1000	.2410 [1]
Ameripol 1001	.2410 [1]
Ameripol 1002	.2435 [1]
Ameripol 1006	.2410 [1]
Ameripol 1006 (crumb)	.2475 [1]
Ameripol 1007	.2410 [1]
Ameripol 1009	.2475 [1]
Ameripol 1009 (crumb)	.2590 [1]
Ameripol 1011	.2475 [1]
Ameripol 1012	.2425 [1]
Ameripol 1012 (crumb)	.2490 [1]
Ameripol 1013	.2410 [1]
Ameripol 1013 (crumb)	.2615 [1]
Ameripol 1500	.2410 [1]
Ameripol 1501	.2410 [1]
Ameripol 1502	.2410 [1]
Ameripol 1703	.2060 [1]
Ameripol 1705	.2035 [1]
Ameripol 1707	.1910 [1]
Ameripol 1708	.1910 [1]
Ameripol 1710	.1885 [1]
Ameripol 1712	.1885 [1]
Ameripol 1805	.1550 [1]
Ameripol 4600	.2410 [1]
Ameripol 4650	.1820 [1]
Ameripol 4651	.1770 [1]
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Ameripol 4655	.1820 [1]
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ASRC 1019	.2650 [1]
ASRC 1500	.2410 [1]
ASRC 1502	.2410 [1]
ASRC 1503	.2625 [1]
ASRC 1703	.2060 [1]
ASRC 1708	.1910 [1]
ASRC 1712	.1885 [1]
ASRC 1713	.1750 [1]
ASRC 3105	.2410 [1]
ASRC 3106	.2410 [1]
ASRC 3110	.2600 [1]
Baytown 1600	.1930 [1]
Baytown 1601	.1930 [1]
Baytown 1602	.1930 [1]
Baytown 1801	.1760 [1]
Baytown 1803	.1740 [1]
C-102 (Shell)	.2300 [2]
Carbomix 3750	.1820 [1]
Carbomix 3751	.1545 [1]
Carbomix 3752	.1845 [1]
Carbomix 3753	.1640 [1]
Carbomix 3754	.1770 [1]
Carbomix 3755	.1470 [1]
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Copo 1500	.2410 [1]
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Copo 1505	.2610 [1]
Copo 1712	.1885 [1]
Copo 1773	.2060 [1]
Copo 1778	.1910 [1]
Copo 2109	.3000 [2]
Copo 3900	.2310 [2]
FR-S 123	.1960 [1]
FR-S 127	.2600 [2]
FR-S 141	.2800 [2]
FR-S 146	.2410 [1]
FR-S 154	.1885 [1]
FR-S 155	.1885 [1]
FR-S 158	.3000 [2]
FR-S 173	.2060 [2]
FR-S 178	.1910 [1]
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FR-S 181	.2410 [2]
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Naugapol 1504	.2950 [2]
OB-102 (Shell)	.1825 [2]
OB-104 (Shell)	.1475 [2]
OB-106 (Shell)	.1510 [2]
OB-110 (Shell)	.1410 [2]
OB-111 (Shell)	.1540 [2]
OB-113 (Shell)	.1750 [2]
Philprene 1000	.2410 [1]
Philprene 1001	.2410 [1]
Philprene 1006	.2410 [1]
Philprene 1009	.2475 [1]
Philprene 1018	.2700 [1]
Philprene 1019	.2650 [1]
Philprene 1500	.2410 [1]
Philprene 1502	.2410 [1]
Philprene 1503	.2625 [1]
Philprene 1601	.1930 [1]
Philprene 1603	.1940 [1]
Philprene 1605	.1900 [1]
Philprene 1703	.2060 [1]
Philprene 1708	.1910 [1]
Philprene 1712	.1885 [1]
Philprene 1803	.1740 [1]
Philprene 1805	.1550 [1]
Plioflex 1006	.2410 [2]
Plioflex 1500C	.2410 [2]
Plioflex 1502	.2410 [2]
Plioflex 1507	.2410 [2]
Plioflex 1703	.2060 [2]
Plioflex 1710C	.1885 [2]
Plioflex 1712C	.1885 [2]
Plioflex 1713	.1750 [2]
Plioflex 1714C	.1725 [2]
Plioflex 1773	.2060 [2]
Plioflex 1778	.1910 [2]
Polysar Kryflex 200	.2510 [2]
Polysar Krylene	.2410 [2]
Polysar Krylene NS	.2410 [2]
Polysar Krynol 651	.1885 [2]
Polysar Krynol 652	.1910 [2]
Polysar S	.2410 [2]
Polysar S-50	.2410 [2]
Polysar S-X 371	.2550 [2]
Polysar SS-250	.2875 [2]
S-1000	.2300 [2]
S-1002	.2325 [2]
S-1006	.2300 [2]
S-1009	.2400 [2]
S-1011	.2325 [2]
S-1013	.2300 [2]
S-1100	.1850 [2]
S-1500	.2300 [2]
S-1502	.2300 [2]
S-1600	.1825 [2]
S-1602	.1825 [2]
S-1605	.1800 [2]
S-1703	.1950 [2]
S-1707	.1800 [2]
S-1709	.1775 [2]
S-1712	.1775 [2]
S-1803	.1650 [2]
S-1804	.1750 [2]
S-7701	.1850 [2]
SP-103 (Shell)	.2900 [2]
Synpol 1000	.2410 [1]
Synpol 1001	.2410 [1]
Synpol 1002	.2435 [1]
Synpol 1006	.2410 [1]
Synpol 1007	.2410 [1]
Synpol 1009	.2475 [1]
Synpol 1012	.2425 [1]
Synpol 1061	.2410 [1]
Synpol 1500	.2410 [1]
Synpol 1502	.2410 [1]
Synpol 1551	.2410 [1]
Synpol 1703	.2060 [1]
Synpol 1707	.1910 [1]
Synpol 1708	.1910 [1]
Synpol 1711	.1900 [1]
Synpol 1712	.1885 [1]
Synpol 8000	.2410 [1]
Synpol 8150	.1930 [1]
Synpol 8200	.1910 [1]
Synpol 8201	.1750 [1]
Synpol 8250	.1740 [1]
Synpol 8253	.1584 [1]
Synpol 8254	.1545 [1]
Synpol X-274	.2550 [1]

Butyl Rubbers

Enjay Butyl 035 and 150	.2300 [2]
Enjay Butyl 165 NS	.2400 [2]
Enjay Butyl 215	.2300 [2]
Enjay Butyl 217	.2300 [2]
Enjay Butyl 218	.2300 [2]
Enjay Butyl 268 NS	.2400 [2]
Enjay Butyl 325	.2300 [2]
Enjay Butyl 365 NS	.2400 [2]
Polysar Butyl 100	.2450 [2]
Polysar Butyl 101	.2775 [2]
Polysar Butyl 200 and 300	.2450 [2]
Polysar Butyl 301	.2550 [2]
Polysar Butyl 400	.2450 [2]

Chlorosulfonated Polyethylene

Hypalon 20	.7000 [2]
Hypalon 30	.7000 [2]

Neoprene

	(prices l.c.l.)
Neoprene Types AC and CG	.5500 [2]
Neoprene Type AD	.5500 [2]
Neoprene Type FB	.6500 [2]
Neoprene Type GN	.4100 [2]
Neoprene Type GN-A	.4100 [2]
Neoprene Type GRT	.4200 [2]
Neoprene Type KNR	.7500 [2]
Neoprene Type S	.4200 [2]
Neoprene Type W	.3900 [2]
Neoprene Type WB	.4100 [2]
Neoprene Type WHV	.3900 [2]
Neoprene Type WRT	.4500 [2]
Neoprene Type WX	.4100 [2]

Polysulfide Rubbers

	(prices l.c.l.)
Thiokol Type A	.5000 [2]
Thiokol Type FA	.6900 [2]
Thiokol Type ST	1.2500 [2]

Silicone Rubbers*

	(prices l.c.l.)
GE (compounded)	2.50 [2]
GE Silicone Gum (not compounded)	4.00 [2]
Silastic (compounded)	1.90 [2]
Silastic (gums)	3.85 [2]
Union Carbide (gums)	4.00 [2]
Union Carbide (compounds)	2.50 [2]

POLYMERS

Latex

(per pound carload)

Butadiene-Styrene Types

Butaprene N-300	.4600 [1]
Butaprene N-400	.5400 [1]
Butaprene N-401	.5400 [1]
Chemigum 200	.4900 [3]
Chemigum 235	.5400 [3]
Chemigum 236	.5400 [3]
Chemigum 245	.4600 [3]
Chemigum 246	.4600 [3]
Chemigum 247	.4600 [3]
Chemigum 248	.4600 [3]
CL-101 (Shell)	.2800 [2]
Hycar 1512	.4600 [3]
Hycar 1551	.5400 [3]
Hycar 1552	.4600 [3]
Hycar 1561	.5400 [3]
Hycar 1562	.4600 [3]
Hycar 1571	.5400 [3]
Hycar 1572	.5100 [3]
Hycar 1577	.4600 [3]
Hycar 1852	.4600 [3]
Nitrex 2612	.4600 [1]
Nitrex 2614	.4600 [1]
Nitrex 2614-A	.4600 [1]
Nitrex 2515	.5100 [1]
Nitrex 2615-A	.5100 [1]
Nitrex 2616	.5400 [1]
Nitrex 2617	.4600 [1]
Nitrex 2617-A	.4600 [1]
Nitrex 2619	.5300 [1]
Nitrex 2620	.4600 [1]
Nitrex 2625	.4600 [1]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3375 [3]
Copo 2110	.3200 [3]
Copo X-800	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000	.2775 [1]
Naugatex 2001	.2775 [1]
Naugatex 2002	.3000 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105	.3200 [1]
Naugatex 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000	.2600 [2]
S-2006	.2600 [2]
S-2101	.2600 [2]
S-2105	.2800 [2]
S-2108	.2900 [2]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [2]
Thiokol Type WD-2	1.2500 [2]
Thiokol Type WD-6	.8000 [2]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

DANGERS of launching a NEW PRODUCT

Snell Research can help overcome them

Here's how, in some typical case histories of Snell clients:

Product Research and Development—A few years ago Snell was retained to develop new products, applications, and markets for sugar. Extensive research and development work by Snell resulted in the creation of a new synthetic detergent—based on *sugar!*

Product Application—A Snell client in the paper industry, for whom we had developed a fine additive, wanted to explore uses in other fields. Unfortunately, their highly qualified staff's experience was limited to the one field. Snell, with experts in practically every product field, found the new product has potentialities as both a good emulsifier and a paint plasticizer. Only the very largest manufacturing companies can duplicate the breadth of experience and background the Snell "brain-trust" of technical experts can offer you!

Product Improvement—One Snell client found their product, an adhesive bandage, slipping in quality. Tape was going gooey in storage on druggists' shelves. Snell research helped this client bring his product quality up to equal the best on the market, and retain his share of sales.

Product Evaluation—A Snell brewery client wanted to expand production and take advantage of a more efficient production technique but feared the taste of the beer might suffer. Snell food technologists, taste panels, and engineers checked the new process and hundreds of samples of beer made under new and old systems, recommended the switch to the more profitable modern process. The change went unnoticed by the customers, and sales continued to climb.

Market Research—A Snell client with a waste product had briefly considered building a plant to use it to manufacture another product; but had given up after their own brief survey showed the new product to be already overproduced. When they consulted Snell for checking, however, Snell predicted there would be a shortage within three years. The client waited two years, built the plant—and now has a profitable new product instead of a waste!

Toxicology—One of the largest frozen food companies began getting complaints on the flavor of one of their green vegetables. Since hundreds of thousands of dollars were at stake, they consulted Snell to find out what was wrong. Snell by analyzing tests, and checking on the farm, was able to prove that the taste—actually toxic—was due to a new type of insecticide sprayed on the fields hundreds of yards away on a windy day long before the harvest!

Engineering—A large midwestern firm desired to produce its own brand of instant coffee, to possess outstanding flavor, body, and bouquet. They engaged Snell to design their extraction line, which is now economically producing a superior product, and have since doubled capacity. Since that time, two additional plants have been modified under our supervision to increase production and improve product characteristics.

What's Your Product Problem?—Whatever it is, and whatever your product field—chemicals, chemical specialties, personal products, pulp and paper, protective coatings, plastics, textiles, foods, petroleum, rubber—Snell has men who "know the score" in that field, and who can work with you creatively and profitably in developing, producing, protecting, and marketing new ideas. This broad experience can be decisive in protecting not only your ideas, but also the thousands of dollars you spend developing them. And the cost of Snell service is less than you might imagine! Half the jobs we do cost less than $1000!

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MARKETS

(continued)

Reclaimed Rubber

Consumption of reclaimed rubber in the month of April suffered somewhat, primarily due to the strikes which hit several major consumers. In April, 22,450 long tons of reclaim were consumed against the 27,869 long tons, a drop of about 15 per cent.

Reclaim, however, fared better with a 15 per cent drop than did natural or synthetic which each dropped about 20 per cent.

In the first four months of this year a total of 99,792 long tons of reclaimed rubber were consumed in the United States. This compares with the 78,849 long tons consumed in the first four months of the previous year.

On the basis of figures available for the first four months of the year it seems reasonable to assume that total consumption of reclaimed rubber in 1959 will approximate 310,000 long tons.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

The Rubber Manufacturers Association reports that 93,480 long tons of scrap rubber were consumed in the first four months of the current year indicating that total consumption for the year will approximate 280,000 long tons.

The trade reports that there has been little change in the scrap rubber market during the past weeks. Some reclaimers were having labor difficulties with consequent reductions in their takings of scrap. Prices, however, have remained firm.

Once the labor problems are out of the way, scrap dealers look to a continuation of the heightened activity which has marked the scrap rubber market since the beginning of the year.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.04¼
No. 1 peelings	ton	30.00
No. 2 peelings	ton	25.00
No. 3 peelings	ton	21.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.05¼

Tire Fabrics

Two leading manufacturers of Tyrex tire cord are planning a substantial rise in expenditures to provide increased production capacity, according to current reports. Directors of the American Enka Corp. have announced that part of their present rayon textile yarn operations will be converted to Tyrex production.

Meanwhile, Industrial Rayon Corp. reported that facilities at its Cleveland, Ohio, plant will be changed over to Tyrex cord "as soon as commitments for that plant's rayon cord are fulfilled."

Replacement Tire Market

Industrial Rayon officials point out that increased capacity for the production of Tyrex cord will mean that substantial amounts can be channelled into the replacement tire market. Nearly all new cars are equipped with Tyrex cord tires and, until recently, all the production went into the manufacture of original equipment tires.

The total demand for Tyrex tire yarn has exceeded the industry's capacity since the third quarter of 1958 in spite of rapid production increases during this period.

Anticipated Demand

American Enka, said to have the largest current availability of Tyrex yarns is stepping up its capacity in anticipation of continued demand. American Enka is one of five companies in the United States and Canada manufacturing the new viscose tire yarn. These companies formed Tyrex, Inc., to certify the new yarn and to promote it through extensive advertising and public relations activities.

Tyrex, Inc., has also set up a comprehensive tire testing program which has not only evaluated current levels of Tyrex yarn and cord, but will operate as a medium for the appraisal of improved Tyrex qualities as they become available from various producers.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb	.67½
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.96
840	lb.	1.61

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.69
11.65 oz. (per square yard)	lb.	.63
14.4 oz. (per square yard)	lb.	.72

Liquid Latex

Natural: A total of 26,839 long tons of natural rubber latex were imported into the United States in the first four months of this year while 1,464 long tons were re-exported leaving a net new supply of 25,375 long tons. In the first four months of the previous year there was a net new supply of 25,836 long tons.

In the first four months of this year, 26,275 long tons of natural latex were consumed against the 21,933 long tons consumed in the first four months of the previous year. At this consumption rate, a total of about 78,000 long tons of natural latex will be used in the United States this year compared with the 70,183 long tons used last year.

Natural rubber latex is currently selling at about a 42-43c per pound level at East Coast ports in car load quantities. Prices have continued to rise over the months. At current levels some buyer opposition may develop, many in the trade believe.

Synthetic: Rising prices for natural latex cannot help but have a beneficial effect upon synthetic latices over the long run. Some in the trade expect that about 75,000 long tons of S-type latex will be produced this year and look for a consumption of close to 70,000 long tons. Last year, something over 60,000 long tons of S-type latex were consumed.

Strikes at some major consumers have tended to keep latex consumption down during the past month. This is a temporary situation, however. In balance, 1959 should be an excellent year for the synthetic latex field.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of only 5 points since our last report (May 1), high for the period being 36.25c reached on every day of trading except May 1 and 3 when the low of $36.20c prevailed. The average price of middling uplands for the month of May was 36.24c based on the 21 trading days in the period. This compares with an average of 36.05c in the previous month.

Delegates to the International Cotton Advisory Committee's 18th plenary meeting in Washington subjected the United States to a barrage of intense criticism for its cotton export subsidy program. The criticism came not only from competing producing countries but also from European countries which produce cotton textiles.

The United States, it is charged, has caused instability in world cotton trade and futures markets and made it impossible for textile producers to engage in any long-range planning. It was noted that there has been a substantial decline in world cotton prices this season despite the fact that world cotton production and disappearance have been in approximate balance.

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JUNE 1, 1959

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1957-58 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74	.81
A-32*	lb.	.66	.80
A-100*	lb.	.52	.66
Accelerator No. 8*	lb.	—	1.25
Accelerator—49*	lb.	.59	.60
Accelerator 89*	lb.	—	1.20
Accelerator 108*	lb.	.92	.97
Accelerator—552*	lb.	—	2.25
Accelerator—808*	lb.	.66	.68
Accelerator—833*	lb.	1.17	1.19
Accelerator B*	lb.	—	.89
Altax*	lb.	.54	.56
Amax*	lb.	.80	.82
No. 1*	lb.	.76	.78
Ancap*(†)	lb.	.38	.40
Ancatax*(†)	lb.	.48	.50
Ancazate BU (ET & ME)*(†)	lb.	—	1.07
Ancazide ET*(†)	lb.	—	1.07
ME*(†)	lb.	—	1.14
Arazate*	lb.	—	2.25
Arquad 12*	lb.	.55	.61
Beutene*	lb.	.66	.71
Bismate, Rodform*	lb.	—	3.00
Butazate*	lb.	.87	.92
Butyl Eight*	lb.	1.10	1.35
Butyl Namate	lb.	.45	.50
Butyl, Ethyl & Meth Zimate Slurry (50% solids content)	lb.	.85	.89
Captax*	lb.	.44	.46
C-P-B*	lb.	1.95	2.00
Cumate, Rodform*	lb.	—	1.45
Cydac*		.76	.78
DIBS*		—	.85
Diorthotolyguanidine	lb.	.69	.70
Dipac*	lb.	—	.85
Diphenylguanidine	lb.	.49	.50
El-Sixty*	lb.	.62	.69
Ethazate*	lb.	—	1.04
50D*	lb.	.87	.92
Ethyl Thiurad*	lb.	—	1.04
Ethyl Tuex*	lb.	—	1.04
Ethylac*	lb.	.93	.95
Guantal*	lb.	.62	.69
Harvex*	lb.	.70	.76
Hepteen Base*	lb.	1.85	1.90
Kure-Blend MT*	lb.	—	.70
Ledate, Rodform*	lb.	—	1.04
MBT-XXX*	lb.	.55	.57
MBTS Pellets*	lb.	.54½	.56½
Merac*	lb.	.75	1.05
Mercaptobenzothiazol	lb.	.44	.46
Mercaptobenzothiazyl Disulfide	lb.	.54	.56
Mertax*	lb.	.55	.62
Methazate*	lb.	—	1.04
Monex*	lb.	—	1.14
Mono Thiurad*	lb.	—	1.14
Morfex*	lb.	.65	.67
2-MT	lb.	.88	.90
NA-22* (for neoprene)	lb.	—	1.05
NOBS No. 1*	lb.	.76	.78
Special*	lb.	.80	.82
O-X-A-F	lb.	.55	.57
Pennac SDB*	lb.	.45	.48
Pentex*	lb.	—	1.24
Flour*	lb.	—	.30
Permalux (Neoprene)*	lb.	—	2.25
Phenex*	lb.	.60	.65
Polyac*	lb.	—	1.85
R-2 Crystals*	lb.	—	4.35
Rotax*	lb.	.55	.57
RZ-50-A*	lb.	—	1.00
B*	lb.	—	1.00
Santocure*	lb.	.76	.83
NS*	lb.	.80	.87
Selenac* (Ethyl, Methyl)	lb.	—	4.25
Seleram, Ethyl	lb.	—	3.00
Setsit-5*	lb.	.75	1.05
9*	lb.	.85	1.15
SPDX-GH*	lb.	.77	.79
GL*	lb.	1.20	1.30
Tellurac*	lb.	—	1.45
Tepidone*	lb.	.45	.48
Tetrone A*	lb.	—	1.98
Thiate A*	lb.	.88	—
B*	lb.	1.05	1.25
Thiofide*	lb.	.54	.61
S*	lb.	.64	.71
Thionex*	lb.	—	1.14
Thiotax*	lb.	.44	.51
Thiram, Ethyl	lb.	—	1.04
Methyl	lb.	—	1.14
Thiurad*	lb.	—	1.14
Thiuram E*	lb.	—	1.04
M*	lb.	—	1.14
Trimene*	lb.	.56	.62
Base*	lb.	1.03	1.10
Triphenyl Guanidine	lb.	—	.90
Tuads* (Ethyl)	lb.	—	1.04
Tuads* (Methyl)	lb.	—	1.14
Tuex*	lb.	—	1.14
Ultex*	lb.	1.15	1.20
Unads*	lb.	—	1.14
Vulcacure NB*	lb.	.45	.45
NS*	lb.	.75	1.05
TMD*	lb.	—	1.14
ZB*, ZE*, ZM*	lb.	.85	.89
Z-B-X*	lb.	2.45	2.50
Zenite*	lb.	.54	.56
Zenite A*	lb.	.69	.71
Zenite Special*	lb.	.55	.57
Zetax* (uncoated)	lb.	.55	.57
Zimate* (Butyl)	lb.	.85	.89
Zimate* (Ethyl)	lb.	.85	.89
Zimate* (Methyl)	lb.	.85	.89
Ziram, Butyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Ethyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89
Ziram, Methyl	lb.	—	1.04
50% Dispersion	lb.	.85	.89

ACTIVATORS

Blue Lead Sublimed (dlvd.)	lb.	.17¼	.18¼
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾	.19
Wochem 210*	lb.	.16¾	.19¼
211*	lb.	.16¾	.19¼
Fish Oil, Hydrogenated, Fatty Acid			
DAR-S* (dlvd.)	lb.	.13	.15½
DAR-HY* (dlvd.)	lb.	.15¾	.18¼
Hydrofol Acids* (dlvd.)	lb.	.15	.25¼
Hyfac 430* (dlvd.)	lb.	.18	.20½
Neo-Fat H.F.O.* (dlvd.)	lb.	.14½	.15¾
Neutrex* (dlvd.)	lb.	.15¾	.18¼
Stearite*	lb.	.11¾	.14¼
Talene* (dlvd.)	lb.	.16¾	.19¼
Lime, Hydrated			
Arrowhead*	ton	—	21.00
Marblehead*	ton	—	19.25
Sierra*	ton	—	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.18	—
SB* (dlvd.)	lb.	—	.18½
Magnesium Oxide, Heavy			
General Magnesite 500*	lb.	.05½	.06
600*	lb.	.06½	.07
Kaiser 325*	lb.	.057	.073
Michigan No. 15*	lb.	.05½	.06½

ACTIVATORS (Cont'd)

Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼	.26
General Magnesite* (neoprene grade)	lb.	.26¾	.28¾
General Magnesite No. 101*	lb.	.23½	.24½
Genmeg MLW*	lb.	.23½	.24½
K & M* (neoprene grade)	lb.	.29¼	.30
Light Calcined Magnesia			
No. X-01*	lb.	.25¼	.26
Maglite D*	lb.	.25¼	—
K*	lb.	.25¼	.27
L*	lb.	.29¾	.30¾
M*	lb.	.27	.28½
Marmag*	lb.	.24¾	.26
Michigan No. 30*	lb.	.25¼	.26
Neomag Powder*	lb.	.29¼	.30
Pellets*	lb.	.31¾	.32
Michigan No. 40*	lb.	.29¼	.30
Oleic Acid			
Dar-Chem* 105	lb.	.17½	.19¾
Drew Wecoline OO*	lb.	.17¾	.19
Emersol 210* (dlvd.)	lb.	.17½	.19¾
Groco Red Oil	lb.	.17½	.19¾
Neo-Fat 92-04*	lb.	.20½	.22½
94-04*	lb.	.18½	.20½
Wochem 310, 311	lb.	.17¼	.19¾
Palm Fatty Acids			
Groco 45*	lb.	.15¾	.18¼
Neo-Fat*	lb.	.15¾	.17¾
Wochem 280*	lb.	.15¾	.18¼
281*	lb.	.16¼	.18¾
Potassium Oleate (dms.)	lb.	.48	.73
Drew 24%*	lb.	.20	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.19	—
No. 2 RM* (dlvd.)	lb.	—	.18½
Sodium Laurate, 75%	lb.	.64	.89
Sodium Oleate, 75%	lb.	.54	.79
Paste (dms.)	lb.	.39	.64
Sodium Stearate, 75%	lb.	.47	.72
Stearic Acid, Single Pressed			
Emersol 110* (dlvd.)	lb.	.16¼	.18¾
Groco 53*	lb.	.16¼	.18¾
Neo-Fat 18-53*	lb.	.14¾	.16¾
Standard Pearlstearic* (dlvd.)	lb.	.16	.18½
Wochem 730*	lb.	.13	.15½
Stearic Acid, Double Pressed			
Choice Pearlstearic* (dlvd.)	lb.	.16	.18½
Emersol 120* (dlvd.)	lb.	.16¾	.19½
Groco 54*	lb.	.16¾	.19¼
Hydrofol Acid 444	lb.	.12¼	.14¾
Neo-Fat 18-54*	lb.	.15¼	.17¾
Wecoline 200*	lb.	.14¾	.16
1000*, 1500*	lb.	.12	.13¼
Wochem 731*	lb.	.15¾	.18¼
Stearic Acid, Other			
Extra Pearlstearic* (dlvd.)	lb.	.17¾	.20¼
Groco*	lb.	.12¼	.14¾
Neo-Fat 18*	lb.	.18½	.20½
18-58*	lb.	.14¼	.16¾
18-61*	lb.	.16¼	.18¾
Stearex* (dlvd.)	lb.	.11¾	.13
Stearite*	lb.	.11¼	.13¾
Wecoline 300*	lb.	.15¼	.16½
Wochem 720*	lb.	.11¾	.14¼
721*	lb.	.11¾	.14¼
732*	lb.	.16¾	.19¼
White Lead Basic Carbonate	lb.	.19	.20
White Lead Basic Sulfate	lb.	.17¼	.18¼
Zinc Laurate			
Laurex*	lb.	.33	.34
Zinc Stearate	lb.	.41	.46
Aquazinc K.C.*	lb.	.30	.55
Crown Brand*	lb.	.39	.44

Unclassified Activators

Actifat* (dms.)	lb.	—	.18
Aktone*	lb.	.21¼	.23¼
Barak*	lb.	—	.65
Curade*	lb.	.57	.59
Dibenzo G-M-F	lb.	—	2.60
D-B-A*	lb.	—	1.95
G-M-F*	lb.	—	2.60
Dibutylamine (dlvd.)	lb.	.55½	.56½
MODX*	lb.	.38	.40
Neo Fat 42-07*	lb.	.10¼	.12¼
Ridacto* (dms.)	lb.	.25	.26
Snodotte* (dlvd.)	lb.	.20¼	.22¼
Vimbra	lb.	.32	.38½
Vulklor*	lb.	.88	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031	.035
M.B.M.C.* (l.c.l.)	lb.	.54	.76

Call Hall

HALLCO NEWS

Issued by
The C. P. Hall Co.
Chemical Manufacturers

No. 5

MODX CUTS COST OF HIGHLY COMPETITIVE RUBBER PRODUCTS

Modx, in tests conducted at the C. P. Hall Research Laboratories, acts as a vulcanization leveler in processing of off-grade natural rubber. Variability in the vulcanizing properties can be overcome by use of Modx in such low grade rubbers as Brown Crepes, Amber Crepes, Flat Bark Crepes and other natural rubbers of non-uniform quality. Smoked Sheets or combinations of them with other lower grade rubbers showed that modulus values were remarkably increased with use of 0.5 to 1.5 parts of Modx. Users of these natural rubbers in highly competitive lines such as mechanicals of all types, molded goods, extruded goods and plumbing specialties will enjoy lower costs and greater profits through use of Modx. As the table below shows, Smoked Sheets and Rolled Brown Sheets processed with Zinc Oxide, Stearic Acid, Phenex, and Sulphur alone, were compared with the same sheets to which only 1.0 part of Modx was added. At 287° F., tensile strength and 600% modulus were increased, while elongation was reduced.

		A	B	C	D
SMOKED SHEETS		100	100	.....	.....
ROLLED BROWN		.....	.....	100	100
Zinc Oxide		5	5	5	5
Stearic Acid		2	2	2	2
Phenex		0.75	0.75	0.75	0.75
Sulphur		3.0	3.0	3.0	3.0
MODX		.....	1.0	.....	1.0
	Cure 287° F.				
Tensile	10	2010	2425	1475	1920
	20	2735	3465	2150	2745
	30	3280	3870	2450	3185
	40	3600	4050	2830	3425
	60	3685	3480	3225	3275
Elongation	10	810	790	810	780
	20	760	750	740	740
	30	720	710	690	700
	40	700	700	680	690
	60	680	650	690	660
600% Modulus	10	570	855	485	745
	20	1100	1500	985	1325
	30	1630	2105	1515	1880
	40	2025	2340	1810	2130
	60	2220	2610	2050	2365

For further information and samples of Modx, call or write The C. P. Hall Company, Akron, Ohio.

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON	CHICAGO	MEMPHIS	LOS ANGELES	NEWARK
Phone	Phone	Phone	Phone	Phone
JEfferson	POrtsmouth	JAckson	MAdison	MArket
5-5175	7-4600	6-8253	2-2022	2-2652

ANTI-FOAMING AGENTS

Aero Anti Foam H*	lb.	—	.20
Regular*	lb.	—	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	5.45	6.65
Antifoam A Emulsion*	lb.	2.05	2.85
Antifoam AF Emulsion*	lb.	2.05	2.85
Antifoam B*	lb.	.65	1.20
Defoama W-1701*	lb.	—	.12½
Defoamer A-25*	lb.	—	3.00
Defoamer 630*	lb.	—	.14
Deltyl Prime	lb.	.70	.80
Foam-Nix*	lb.	.50	1.25
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	—	.36
Kessco X-3* (dms.)	lb.	—	.39
X-180*	lb.	—	.28
X-181*	lb.	—	.36½
Nopco 1407*	lb.	.19½	.21½
1497-V*	lb.	.14¼	.16¼
1907-B*	lb.	.22½	.24½
JMK*	lb.	.48½	.50½
JMU*	lb.	.23¼	.25¼
JMY*	lb.	.21	.23
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	5.25	6.50
470*	lb.	.69	1.20
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

Agebest 1293-22A*	lb.	1.90	2.00
AgeRite Alba*	lb.	2.40	2.50
Gel*	lb.	.70	.72
Hipar*	lb.	1.05	1.07
H.P.*	lb.	.79	.81
Powder*	lb.	.57	.59
Resin*	lb.	.88	.90
Resin D*	lb.	.57	.59
Spar*	lb.	.57	.59
Stalite & Stalite S*	lb.	.57	.59
Superlite*	lb.	.57	.59
White*	lb.	1.50	1.60
Akroflex C*	lb.	.85	.87
CD*	lb.	.79	.81
Alcogard 354*	lb.	1.40	1.52
Aminox*	lb.	.57	.62
Antioxidant 425*	lb.	2.47	2.50
Antioxidant 2246*	lb.	1.50	1.53
Antox*	lb.	.59	.61
Aranox*	lb.	3.25	3.30
Benzoquinone	lb.	1.50	1.75
Betanox Special*	lb.	.91	.96
B-L-E*	lb.	.57	.62
B-X-A*	lb.	.55	.57
Catalin CAO No. 1*	lb.	.91	.95
CAO No. 3*	lb.	1.05	1.07
CAO No. 5*	lb.	1.49	1.50
CAO No. 6*	lb.	—	3.20
Deenax*	lb.	.95	1.05
Di-tert-Butyl-para-Cresol	lb.	.86	1.16
Eugenol C-95%*	lb.	2.30	2.50
Flectol H*	lb.	.57	.64
Flexamine*	lb.	.79	.84
Ionol* (dms.)	lb.	.91	.95
Neozone A*	lb.	.64	.66
C*	lb.	.86	.88
D*	lb.	.57	.59
Nevastain A*	lb.	.51	.61
B*	lb.	.51	.70
Nullapon BF-12*	lb.	—	.21½
BF-13*	lb.	—	.25½
BF-78*	lb.	—	.55
BF-Acid*	lb.	—	.85
Octamine*	lb.	.57	.62
Oxidex*	lb.	—	3.60
PDA-10*	lb.	.46	.48
Permalux*	lb.	—	2.25
Polygard*	lb.	.52	.62
Santoflex AW*	lb.	.71	.78
DD*	lb.	.57	.64
75*	lb.	1.01	1.08
Santovar-A*	lb.	1.55	1.62
Santowhite Crystals*	lb.	1.55	1.62
Santowhite L*	lb.	.57	.64
MK*	lb.	1.25	1.32
Powder*	lb.	1.55	1.62
Sequestrene AA*	lb.	.70	.80
NA2*	lb.	.59	.66
NA3*	lb.	.58	.65
Stabilite*	lb.	.57	.59
Alba*	lb.	.75	.80
FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tannic Acid, Tech.	lb.	.46	.48
Tenamene 3*	lb.	.91	.95
Thermoflex A*	lb.	1.05	1.07
V-G-B*	lb.	.75	.77
Wing-Stay S*	lb.	.53	.57

ANTIOZONANTS

Eastozone* 30, 31	lb.	1.05	1.09
Fura-Tone NC-1008*	lb.	.28	.39
NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.79	.86
UOP 88* & 288* (dms.)	lb.	1.05	1.07

ANTI-SCORCHING AGENTS

Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	—	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.68½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Ortho Cresol (26°—27°)	lb.	.14	.16¼
Preventol GD	lb.	—	1.09
Retarder D*	lb.	.42	.50
Vancide	lb.	—	.80

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	5.05	6.50
Webnix 34-L*	lb.	1.25	1.75
57*	lb.	1.50	2.00
69-C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	—	6.50
122*	gal.	—	6.50
186*	gal.	—	6.50
Alamask AA*	lb.	—	3.00
AF*	lb.	—	2.50
AO*	lb.	—	1.50
AR*	lb.	—	.50
BG*	lb.	—	1.15
BGM*	lb.	—	.60
CY*	lb.	—	2.40
DI*	lb.	—	3.35
DL*	lb.	—	1.95
H*	lb.	—	5.50
LD*	lb.	—	.75
ND*	lb.	—	2.75
O*	lb.	—	6.50
OS*	lb.	—	5.25
Bouquet 149*	lb.	—	3.00
Coumarin*	lb.	—	3.70
Curodex 19*	lb.	4.75	4.90
188*	lb.	5.75	5.90
198*	lb.	6.75	6.90
Deodorant 65*	lb.	—	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	—	4.00
18301	lb.	—	3.00
22258	lb.	—	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	—	2.25
Gamma*	lb.	—	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
Rubbarome* (dms.)	lb.	.60	3.80
Rubber Perfume 12*	lb.	—	4.35
Russian Leather 7*	lb.	—	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	—	8.00
Better Blend Soda* (c.l., bags)	cwt.	—	2.55
Blowing Agent No. 81105	lb.	.32	.35
Celogen*	lb.	—	1.95
AZ*	lb.	—	1.95
Diazo Amino Benzene	lb.	—	.73
Kempore R-125	lb.	—	1.92
Neo Fat 42-12*	lb.	.10¼	.12¼
Opex 40	lb.	.68	.72
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	—	2.40
Unicel ND*	lb.	—	.72
S*	lb.	—	.20
Urea	lb.	.06	.07

BONDING AGENTS

Base 6986*	lb.	.27	.32
Braze*	gal.	6.00	9.00
Chemlok 201, 203, 220, 401, 607	gal.	5.00	24.00
614	lb.	4.35	4.75
Cover Cement*	gal.	2.50	4.00
Durez 12987*	lb.	.47½	.51½
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.70	2.00
M-50*	lb.	1.00	1.25
Penacolite B1A*	lb.	—	.95
R-2710*	lb.	—	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97

BONDING AGENTS (Cont'd)

Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	3.30	9.00
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	—	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	—	.09½
Zinc Nitrate, Tech. Flake	lb.	—	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¾	.12¼
Black Shield 4*	lb.	.09	.09½
No. 5	lb.	.10	.10½
No. 6	lb.	.09	.09¾
No. 19	lb.	.11	.11½
L-1404B	lb.	.10½	.11
Carbon Black—See *Reinforcing Agents*			
Cooke 1026*	lb.	—	2.50
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¼	.14½

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue*	lb.	2.20	3.75
Disco Blues	lb.	2.20	3.45
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD, Dispersed*	lb.	—	2.55
Peacoline Blue*	lb.	—	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	—	4.75
Rubber Blue X-1999*	lb.	—	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	.75	3.60
Stan-Tone MBS*	lb.	2.20	2.85
GPE*	lb.	—	1.50
PEC*	lb.	.93	1.08
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.60

Brown

Brown Iron Oxide	lb.	.15¼	.15½
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	—	3.00
Vansul Brown M.B.* (Organic)	lb.	—	2.30

Green

Akron Masterbatches*	lb.	1.38	3.08
Toners*	lb.	1.35	4.95
Cooke M.B. Green*	lb.	1.60	2.80
1013*	lb.	—	2.80
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Monastral Rubber Green GSD* (Dispersed)	lb.	—	2.80
GSL*	lb.	2.20	2.20
Permansa Green CP-1236*	lb.	—	1.35
Pigment Green B*	lb.	1.45	1.45
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	—	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	—	2.05
Rubber Green X-1292*	lb.	—	1.75
Solfast Green*	lb.	—	3.95
Stan-Tone MBS*	lb.	1.55	3.35
GPE*	lb.	—	3.00
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	3.00

Maroon

Akron Masterbatches*	lb.	—	4.10
Toners*	lb.	2.00	4.00
Pyrolux Maroon*	lb.	—	3.40
Vansul Maroon M.B.*	lb.	—	3.35

Orange

Akron Masterbatches*	lb.	2.42	2.77
Toners*	lb.	2.82	4.00
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
1021*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Mercadium X-2667*	lb.	—	1.58
Molybdate Orange	lb.	—	.48
Oswego Orange X2065*	lb.	—	3.15
Rubber Orange OD* (Disp.)	lb.	—	2.25
Stan-Tone Cadmium Dry*	lb.	1.85	4.23
Cadmium Paste*	lb.	2.48	2.80
GPE*	lb.	1.20	4.35
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.40	2.45

An accountant gave us an idea that adds up

"I'd like to be more systematic about my personal accounts," our accountant remarked. "I wish I had a plan to make me *save*, every single payday."

We explained that we have the finest kind of mechanism for regular savings—the plan for buying U.S. Savings Bonds through Payroll Savings. But she had given us an idea. If *she* was not familiar with our plan, there must be many other employees, too, who didn't know we have such a system.

We put in a call for our State Savings Bond Director. He sparked a company-wide plan that told our people about systematic buying of U.S. Savings Bonds. Every person on our payroll received an application card.

Within days we had the best employee participation we've enjoyed since the mid-forties. It showed that people welcome a chance to set up this soundest of investment plans. Today there are more payroll savers than ever before in peace time. Look up your State Director in the phone book or write: Savings Bonds Division, U.S. Treasury Dept., Washington, D. C.

RUBBER AGE

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE

COLORING AGENTS (Cont'd)

Red

Akron Masterbatches*	lb.	1.00 -	3.53
Toners*	lb.	.88 -	5.60
Arcturus Reds*	lb.	— -	1.35
Antimony Trisulfide	lb.	.72 -	.78
R.M.P. Sulfur Free*	lb.	— -	.78
R.M.P. No. 3*	lb.	— -	.72
Brilliant Toning Reds*	lb.	1.65 -	1.90
Cadmolith Red* (dms.)	lb.	1.94 -	2.87
Cooke M.B. Red*	lb.	1.05 -	3.25
1010*	lb.	— -	1.75
Disco Reds	lb.	1.05 -	3.25
Graphic Red* (dlvd.)	lb.	.98 -	1.03
Kroma Reds*	lb.	.14 -	.15
Lake Red C*	lb.	— -	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼ -	.14½
Mercadium X-2668 Light*	lb.	— -	1.65
X-2669 Medium Light*	lb.	— -	1.73
X-2670 Medium*	lb.	— -	1.80
X-2671 Dark*	lb.	— -	1.88
Oximony Red Iron Oxide	lb.	.12¾ -	.13
Polaris Red*	lb.	— -	1.70
Recco Red Oxide*	lb.	.12 -	.13
Red Iron Oxide, Light	lb.	.13¾ -	.14
Red Powders	lb.	— -	4.40
Rubber Dispersed Reds	lb.	1.47 -	3.58
Rubber Red PBD* (Disp.)	lb.	— -	2.05
2BD, Dispersed*	lb.	— -	2.00
2BL*	lb.	1.24 -	1.24
PBL*	lb.	1.24 -	1.24
Rubanox Reds*	lb.	1.47 -	1.60
Rubber Red CP-339* (dlvd.)	lb.	— -	1.10
Rubber Red X-1148*	lb.	— -	.93
Solfast Red*	lb.	1.47 -	1.80
Stan-Tone MBS*	lb.	1.00 -	3.75
GPE*	lb.	.77 -	3.15
PC*	lb.	1.30 -	2.50
PDS*	lb.	1.40 -	1.55
PVC*	lb.	1.65 -	1.90
Vansul Red M.B.*	lb.	1.05 -	3.35
Watchung Red*	lb.	1.90 -	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼ -	.23½
20* (50 lb. bags)	lb.	.23¼ -	.23½

White—Lithopone

Eagle-Picher*	lb.	.0800 -	.0975
Permolith*	lb.	.08375-	.09125
Sunolith*	lb.	.0800 -	.0875

White—Titanium Pigments

Iceberg*	lb.	— -	.02½
Icecap K*	lb.	— -	.03¼
Horse Head Anatase Grades*	lb.	.25½ -	.26½
Rutile Grades*	lb.	.27½ -	.28½
Stan-Tone PC*	lb.	.55 -	.60
Ti-Cal*	lb.	.09 -	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09¾ -	.09⅞
R-60*	lb.	.09⅝ -	.10⅛
Ti-Pure*	lb.	24½ -	27½
Anatase Grades*	lb.	25½ -	26½
R-100*, R-500*	lb.	7¾ -	8½
Titanox A*—all grades (dlvd.)	lb.	.25½ -	.26½
C-50* (dlvd.)	lb.	.14⅜ -	.14⅝
RA* (dlvd.)	lb.	.27½ -	.28½
RA-10* (dlvd.)	lb.	.27½ -	.28½
RA-NC* (dlvd.)	lb.	.27½ -	.28½
RC* (dlvd.)	lb.	.09⅝ -	.10⅛
RC-HT* (dlvd.)	lb.	.09⅜ -	.09⅞
Unitane O-110*	lb.	.25½ -	.26½
O-220*	lb.	.25½ -	.26½
O-310*	lb.	.25½ -	.26½
O-410*	lb.	.25½ -	.26½
OR-150*	lb.	.27½ -	.28½
OR-250*	lb.	.27½ -	.28½
OR-340*	lb.	.27½ -	.28½
OR-342*	lb.	.27½ -	.28½
OR-350*	lb.	.27½ -	.28½
OR-540*	lb.	.27½ -	.28½
OR-640*	lb.	.27½ -	.28½
Zopaque*	lb.	.24½ -	.25½
R*	lb.	.26½ -	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1450 -	.1550
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1450 -	.1550
Eagle-Picher AAA*	lb.	.1450 -	.1550
Horse Head Special*	lb.	.1450 -	.1550
XX*	lb.	.1450 -	.1550
Protox 166*	lb.	.1450 -	.1550
167*	lb.	.1450 -	.1550
267* (pelleted)	lb.	.1450 -	.1550
St. Joe Black Label*	lb.	.1450 -	.1550
Green Label*	lb.	.1450 -	.1550
Red Label*	lb.	.1450 -	.1550
Pelleted	lb.	.1450 -	.1550

COLORING AGENTS (Cont'd)

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	— -	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1450 -	.1550
Florence Green Seal*	lb.	.1625 -	.1725
Red Seal*	lb.	.1575 -	.1675
White Seal*	lb.	.1675 -	.1775
Kadox 25*	lb.	.1675 -	.1775
15*, 17*, 72* & S15	lb.	.1450 -	.1550
Protox 168*	lb.	.1450 -	.1550
169*	lb.	.1450 -	.1550
268* (pelleted)	lb.	.1450 -	.1550
U.S.P. (cartons)	lb.	.1775 -	.1875
XX-78*	lb.	.1450 -	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530 -	.2630
Lehigh 35%*	lb.	.15125-	.16125
50%	lb.	.15375-	.16375

Yellow

Akron Masterbatch*	lb.	1.12 -	2.18
Toners*	lb.	2.10 -	6.00
Benzidene-Lightfast	lb.	3.40 -	5.35
Benzidine Yellow	lb.	1.41 -	2.55
Cadmolith Yellow (dms.)	lb.	1.12 -	1.20
Chrome Yellow	lb.	.35 -	.35
Cooke M.B. Yellow 405*	lb.	2.15 -	2.75
105*	lb.	— -	2.15
Disco Yellows	lb.	2.05 -	3.95
Iron Oxide, Pure			
Light Shades	lb.	.12 -	.12¼
Dark Shades	lb.	.11½ -	.11¾
Mapico Yellow* (50 lb. bags)	lb.	.12 -	.12¼
Rubber Dispersed Yellows	lb.	1.27 -	2.13
Rubber Yellow GD* (disp.)	lb.	— -	2.25
GL*	lb.	— -	1.68
Rubber Yellow X-1940*	lb.	— -	2.35
Stan-Tone Cadmium Dry*	lb.	2.80 -	2.98
Cadmium Paste	lb.	1.77 -	1.79
MBS*	lb.	1.30 -	2.20
GPE*	lb.	.77 -	3.25
PC*	lb.	.55 -	3.40
Toluidine Yellow	lb.	2.20 -	2.20
YL-660 D*	lb.	1.25 -	1.35
Oximony Iron Oxide	lb.	.12¾ -	.13
Vansul Yellow M.B.*	lb.	1.15 -	2.15
Yellow Powders	lb.	2.00 -	5.00
Zinc Yellow	lb.	.29 -	.29

DISPERSING AGENTS

Ancloid*(†)	lb.	.24 -	.25
Anhydrapent*	lb.	.56 -	.59
Armeen 18*	lb.	.39 -	.45
Belloid TD*	lb.	.15¾ -	.16¼
Blancol*	lb.	— -	.15¾
Darvan No. 1*, No. 2*, No. 3*	lb.	.22 -	.30
Daxad 11* (21*, 23*)	lb.	.08 -	.30
Diethanolamine (dms., dlvd.)	lb.	.24½ -	.27
Dispersaid*	lb.	1.25 -	1.35
Emcol K-8300* (dms.)	lb.	.14 -	.18
P10-59	lb.	.32 -	—
5120	lb.	.31 -	—
5138	lb.	.31 -	—
Emulphor ON-870*	lb.	— -	.55
Furala*	lb.	.06½ -	.07½
Halloid*	lb.	.04½ -	.05½
Igepal CO-630*	lb.	— -	.29
Igepon T-73*	lb.	— -	.29½
Kyro EO* (dms.)	lb.	— -	.29¾
Leonil SA*	lb.	— -	.55
Lipal No. 9-N*	lb.	.28 -	.29
LI-O*	lb.	.28 -	.29
Lomar PW*	lb.	.15¼ -	.15¾
Marasperse C*	lb.	.06¼ -	.06¾
CB*	lb.	.13 -	.13
N*	lb.	.09½ -	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25 -	.27½
Naccotan A*	lb.	.16½ -	.17
Nekal BA-75*	lb.	— -	.40
BX-78*	lb.	— -	.64
Nopco 1187-X*	lb.	.15 -	.16
Pluronic F68*	lb.	.38½ -	.44
Polyfon*	lb.	.08 -	.10
R & R 551*	lb.	— -	.28
Rubbex*	lb.	.247 -	.277
Stablex B*	lb.	.50 -	.95
Stan-Chem BQC*	lb.	.12¼ -	.17¼
1067*	lb.	— -	.13½
1471*	lb.	.1687 -	.2187
2251*	lb.	.12¼ -	.17¼
Trenamine D-25*	lb.	.32½ -	.36
Triethanolamine (dms., dlvd.)	lb.	.22 -	.25½
Yelkin TT* (and TTS*)	lb.	.13 -	.16

EXTENDERS

Areco 1071-13B*	lb.	.14½ -	.15½
1073-18B*	lb.	.13½ -	.14½
1294-36B*	lb.	.11½ -	.12½
Car-Bel-Ex-A* (and B*)	lb.	— -	.14
Extender 600*	lb.	— -	.1870
Facile Gum 4A*	lb.	.48 -	.50
Millex*	lb.	— -	.07
W*	lb.	— -	.07

EXTENDERS (Cont'd)

Nopco 2271*	lb.	.16¾ -	.18¾
Polyco 418*	lb.	.17 -	.18
PR-162 Latex Extender*	lb.	— -	.182
Solvitose HDF*	lb.	.22 -	.25
Synprolac*	lb.	.16 -	.23
Synprowax*	lb.	— -	.23
Vistanex MM Grades*	lb.	— -	.35

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½ -	1.35
Lionite*	lb.	.16 -	1.27
Pumice	lb.	.03 -	.05
Walnut Shell Grits	ton	60.00 -	110.00
Aluminum Hydrate	lb.	.031 -	.170
Kaiser Alumina*	lb.	.026 -	.059
Aluminum Silicate			
AFD*	ton	29.50 -	36.00
Aluminum Flake*	ton	29.50 -	36.00
Marter White*	ton	18.50 -	30.00
Barium Carbonate (l.c.l.)	ton	109.00 -	126.50
Barytes			
No. 1 Floated, White*	ton	55.00 -	79.85
No. 2 Floated, Unbleached*	ton	50.00 -	74.85
No. 22 Barytes* (c.l.)	ton	— -	30.00
No. 3805 Barytes*	ton	22.00 -	26.75
Foam A*	ton	— -	55.00
Sparmite*	ton	80.00 -	90.00
X10R*	ton	80.00 -	90.00
Bentonite (c.l.)	ton	— -	13.50
Argosite Clay* (c.l.)	ton	— -	12.50
Bennett Clay* (c.l.)	ton	— -	32.50
SPV Volclay* (c.l.)	ton	— -	13.50
White Hi-Gel*	ton	— -	65.90
Blanc Fixe	ton	125.00 -	142.00
Calcium Carbonate			
Atomite* (c.l.)	ton	— -	32.50
B.I. White No. 1 (c.l.	ton	— -	10.00
Calcene NC*	ton	80.00 -	100.00
TM*	ton	82.50 -	102.50
Calwhite*	ton	— -	20.00
Camel-Carb*	ton	— -	14.00
Camel-Tex*	ton	— -	22.00
Camel-Wite*	ton	— -	35.00
CCO White*	ton	— -	22.00
Duramite*	ton	— -	20.00
Gamaco* (c.l.)	ton	— -	32.50
Georgia Marble 5-25* (c.l.)	ton	— -	20.00
No. 10 White* (c.l.)	ton	— -	11.00
Kalite*	ton	52.50 -	67.50
Laminar*	ton	— -	30.00
Lesmite* (c.l.)	ton	— -	27.50
Lorite*	ton	30.00 -	36.00
Millical*	ton	38.00 -	53.00
Multifex MM*	ton	117.50 -	137.50
Non-Fer-Al*	ton	35.00 -	50.00
Purecal M*	ton	56.75 -	80.75
NC* (and T*)	ton	110.00 -	125.00
U*	ton	120.00 -	135.00
PPTD* (c.l.)	ton	— -	30.00
Rambo No. 1*	ton	— -	11.50
Snowflake*	ton	— -	20.00
Super Multifex*	ton	167.50 -	187.50
Surfex*	ton	42.00 -	57.00
Suspenso*	ton	38.00 -	43.00
Witcarb Reg.*	ton	60.00 -	85.00
*	ton	117.50 -	140.00
R*	ton	127.50 -	150.00
RC*	ton	117.50 -	140.00
York White*	ton	— -	11.50
Calcium Silicate			
Silene EF*	lb.	.055 -	.065
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	— -	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	— -	17.00
Chalk Whiting (l.c.l.)	lb.	.01½ -	.01¾
Recco Paris Whiting*	ton	— -	35.00
OMYA Whiting*	ton	— -	30.00
Clay			
Afton Clay*	ton	13.00 -	38.00
Aiken Clay*	ton	14.50 -	—
Alsilite* (c.l.)	ton	30.00 -	45.00
Aluminum Flake*	ton	25.50 -	28.50
Buca* (c.l.)	ton	— -	45.00
Burgess No. 20*	ton	— -	35.00
No. 30*	ton	— -	37.00
Burgess Iceberg*	ton	— -	50.00
Icecap K*	ton	— -	65.00
Catalpo* (c.l.)	ton	— -	35.00
Champion*	ton	— -	14.50
Crown*	ton	— -	14.00
Dixie* (c.l.)	ton	— -	14.50
Franklin Clay—R* (c.l.)	ton	16.00 -	41.50
G K Soft*	ton	11.00 -	28.00
Harwick Clays*	ton	21.50 -	77.00
Hi-White R*	ton	14.50 -	—
Kaolloid Clay* (c.l.)	ton	— -	10.50
LGB*	ton	17.50 -	22.50
LGP*	ton	20.00 -	25.00
McNamee* (c.l.)	ton	— -	14.50
Natka 1200	ton	13.00 -	35.00
Par* (c.l.)	ton	— -	13.00
Paragon*	ton	14.50 -	19.50
Pigment 5*	ton	27.50 -	34.50
33*	ton	— -	37.00
Recco* (c.l.)	ton	— -	14.50
Swanee Clay*	ton	— -	12.50
Snobrite*	ton	— -	12.50
Suprex*	ton	14.50 -	19.50
Whitetex* (c.l.)	ton	— -	50.00
Windsor*	ton	14.50 -	39.50
4200 Clay*	ton	13.00 -	—

ONE CALL

COPOLYMER'S manufacturing facilities and administrative offices are located at Baton Rouge, Louisiana . . . This assures fast, competent, and correlated action on any questions posed by you . . . This applies to questions concerning management, research, development, production, sales, and traffic.

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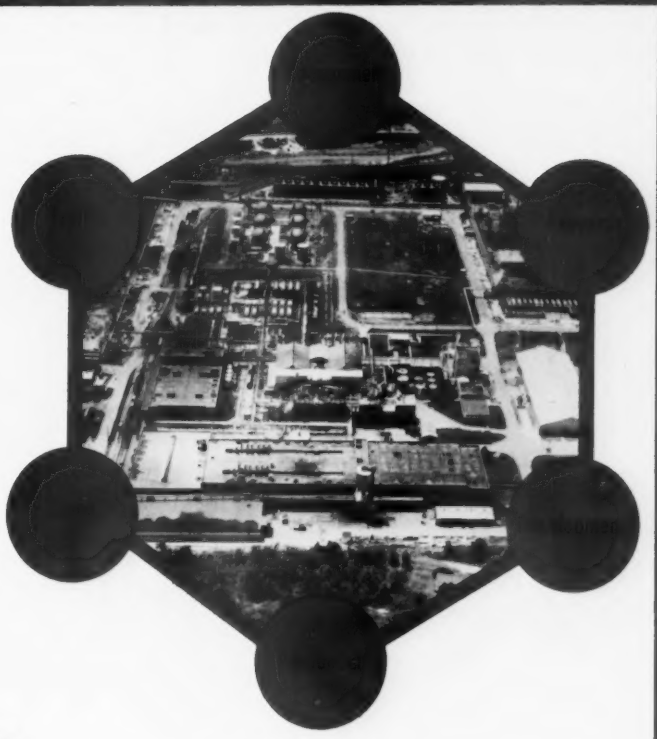

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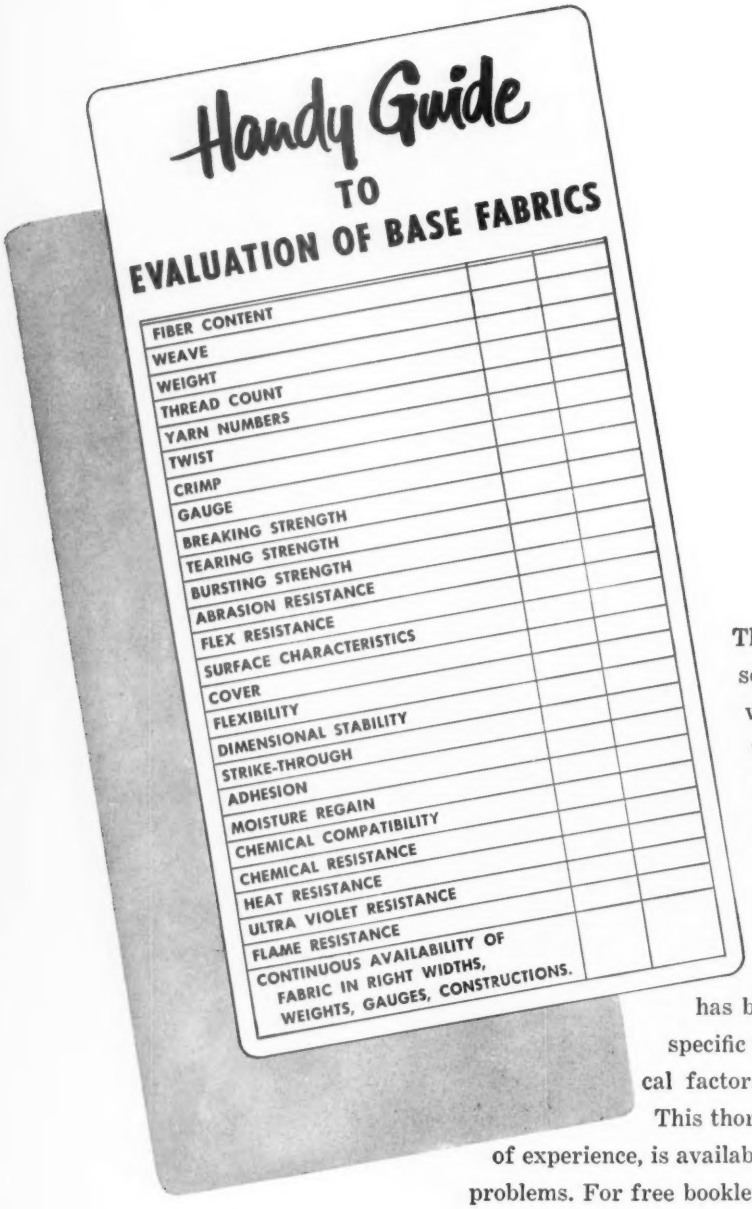

This fictitious "guide" has been created solely to show some of the factors which often have to be considered in the selection of a base fabric. They serve only to point up one fact: that there can be *no* such thing as a put-it-in-your-pocket guide in this field. But one thing is certain: when you're guided by Wellington Sears, you know that your base fabric has been considered in the light of your specific need, and that all significant technical factors have been thoroughly examined. This thoroughness, plus more than a century of experience, is available to help solve *your* working-fabric problems. For free booklet, "Fabrics Plus," write Dept. G-6.

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Has a rapid incorporation rate. facilitates pigment dispersion. Does not retard the cure in the presence of organic accelerators. Prevents the sagging of extruded goods and stock contraction previous to the cure.

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Saves considerably on white pigments and color.

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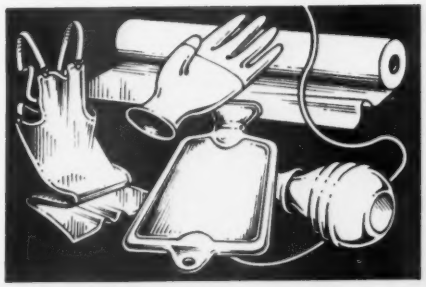
Feel free to submit your problems to us. Just explain your difficulty, or describe the effect you wish to achieve. Without obligation, our laboratory will gladly make helpful recommendations. Data on request any time.



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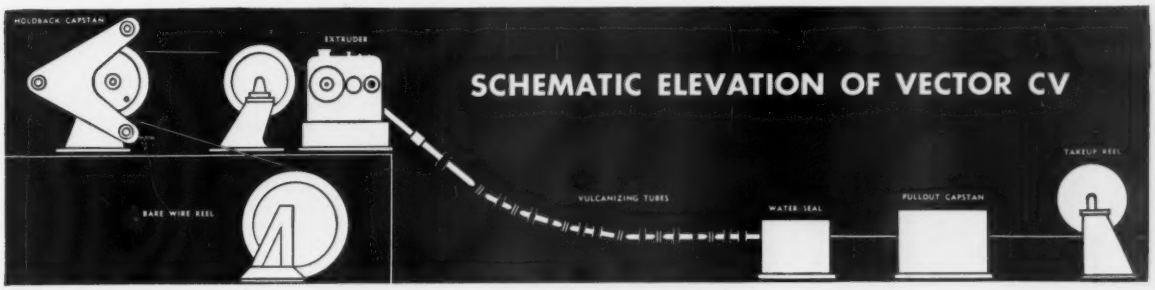

FOR RUBBER COVERED WIRE AND CABLE VECTOR CV

VECTOR CV with special new double seal combines the advantages of horizontal and vertical CV without the disadvantages of either. Check these important features:

- **QUALITY**—wire and cable is completely supported externally to prevent scuffing and distortion.
- **SPEED**—full cycle of vulcanizing and pressure cooling assures production speeds commonly associated with horizontal CV.
- **VERSATILITY**—Positive support and full length of vulcanizing tubes assures economical production of a wide range of cable.
- **ECONOMY**—Easily installed without extensive—and expensive—plant alterations.
- **COMPLETE** electrical control.

NEW: - "CONSTANT PRESSURE" ROLLER HOPPER

Closer diameter control • Improved product density • Increased production • Labor saving

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ROYLE PATERSON N. J. 1880

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Hyde Park 2430 - 0456	SHerwood 2-8262	BLackstone 3-9222	TOpaz 1-0371	(56) 2130 - 2149

FILLERS (Cont'd)

Diatomaceous Earth	ton	30.00	- 50.00
Celite 270	ton	55.00	-121.00
292	ton	36.00	- 95.00
Kaylorite* (c.l.)	ton	—	- 30.00
Lorite*	ton	—	- 36.00
Flock			
Cotton (White)	lb.	.26	- .28
Colored	lb.	.12	- .26
Filfloc F 40-9000*	lb.	—	- .13
F 6000*	lb.	—	- .36
Polycel*	ton	110.00	-210.00
Rayon, Bleached or Dyed	lb.	.75	- 1.20
Rayon, Grey	lb.	—	- .18
Rayon, Pink	lb.	—	- .20
Solka-Floc* (l.c.l.)	lb.	.07	- .16
Glue, Amber	lb.	.17	- .19
Ground Softwood Bark Silvacon* (c.l.)	ton	55.00	-100.00
Leather			
Flour (dust)	lb.	.12	- .15
Shredded	lb.	.05	- .17
Lignin	lb.	.06	- .08
Indulin*	lb.	.06	- .08
Limestone, Pulverized	ton	3.00	- 5.00
Asbestol Regular*	ton	27.00	- 29.00
Asbestol Superfine*	ton	32.00	- 34.00
Georgia Marble No. 10*	ton	—	- 11.00
Industrial Filler No. 100*	ton	—	- 7.75
Micro Velva A*	ton	49.00	- 51.00
L*	ton	57.00	- 59.00
No. 1 White*	ton	—	- 11.00
Magnesium Carbonate	lb.	.10½	- .13
K & M Clearcarb*	lb.	—	- .14
Technical* (c.l., eqld.)	lb.	.10½	- .12
Marinco CL*	lb.	.11	- .13
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	- .07 ⅛
Concord*	lb.	.08	- .08¾
Micro-Mica*	lb.	.08	- .08¾
Mineralite* (c.l.)	ton	40.00	- 85.00
Silversheen*	lb.	.08	- .08¾
Triple A Mica* (c.l.)	ton	—	- 35.00
Vermiculite*	lb.	—	- .11
Wet Ground Biotite Mica	lb.	.06½	- .07½
Wet Ground Mica No. 160*	lb.	.08	- .08¾
Pecan Shell Flour Stan Shell*	ton	45.0¢	75.0¢
Pyrophyllite			
No. 261*	ton	—	- 11.50
Pyrax A* (c.l.)	ton	14.50	- 15.00
WA* (c.l.)	ton	17.00	- 17.50
Sawdust, Graded	ton	14.00	- 35.00
Silica	ton	16.00	- 27.00
Extra Fine (bags) (c.l.)	ton	—	- 43.00
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Lo-Micron Slate Flour*	lb.	—	- .04½
No. 133 Slate Flour*	ton	—	- 4.55
Sodium Silico Aluminate Zeolex 23*	lb.	.06	- .07
Talc (Magnesium Silicate)			
Asbestol Regular*	ton	—	- 27.00
Eastern RC-500*	ton	—	- 32.00
No. 41*	ton	—	- 19.70
No. 549*	ton	—	- 63.00
French*	ton	—	- 59.00
No. 367*	ton	—	- 13.00
No. 1600*	ton	—	- 70.60
No. 1768*	ton	—	- 13.00
Nytal 200* (c.l.)	ton	—	- 28.00
300* (c.l.)	ton	—	- 38.00
Sierra Fibrene C-400*	ton	33.00	- 38.00
Sierra Supreme 325*	ton	48.75	- 57.25
Sierra White*	ton	20.75	- 31.75
Soapstone*	ton	—	- 13.00
Walnut Shell Flour	ton	55.00	-100.00
Agrashell*	ton	55.00	-115.00
Stan-Shell*	ton	50.00	-100.00
Whiting, Commercial	ton	—	- 7.50
Allied Whiting*	ton	10.50	- 21.50
Camel-Carb*	ton	—	- 10.00
Calwhite (c.l.)	ton	—	- 20.00
C-C-O White*	ton	—	- 22.00
Georgia Marble No. 15*	ton	—	- 20.00
No. 18*	ton	—	- 20.00
Piqua No. 1 YAA* (c.l.)	ton	10.00	- 10.00
No. 2 LS* (c.l.)	ton	10.00	- 10.00
Snowflake* (c.l.)	ton	—	- 20.00
Stan-White 325*	ton	11.50	- 14.10
Ultrasil*	lb.	.35	- .50
Veroc* (c.l.)	ton	—	- 11.50
Welco* (c.l.)	ton	—	- 10.50
York White R* (c.l.)	ton	—	- 11.00
Wood Flour	ton	31.50	- 48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	- 2.35
Black Out*	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.40	- .50
VanWax*	ga.	1.45	- 1.50

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	—	- .65
Chlorowax 40*	lb.	.15	- .17½
50*	lb.	.16	- .18½
70*	lb.	.18½	- .20
Halowax*	lb.	.36	- .46
Zinc Borate 3167*	lb.	.1920	- .2020
Zyrox Compounds*	lb.	.88	- .95½

LATEX MODIFIERS

Ludox	lb.	.15	- .16¾
OPD-101*	lb.	.29	- .36
Piccopale A-1 Emulsion	lb.	.086	- .113
Ubatol U-2001* (t.c.)	lb.	.166	- .187
U-2003* (t.c.)	lb.	.184	- .208
U-2007* (t.c.)	lb.	.166	- .187
U-3025* (c.l.)	lb.	.223	- .235
U-3040* (c.l.)	lb.	.260	- .272
U-3045* (c.l.)	lb.	.260	- .272
U-3050* (c.l.)	lb.	.195	- .207

LUBRICANTS, MOLD

Akro Gel*	lb.	—	- .165
Alipal CO-433*	lb.	—	- .20
CO-436*	lb.	—	- .24
Aluminum Stearate Crown Brand*	lb.	.37	- .42
Amine, Mixed Crude*	lb.	.19	- .25
Aquadag*	lb.	3.50	- 4.00
Aquarex D*	lb.	—	- .81
L*	lb.	—	- .94
ME*	lb.	—	- .82
MDL*	lb.	—	- .33
WAQ*	lb.	—	- .22
Armeen HT*	lb.	.34	- .40
180*	lb.	.52	- .56
Armid HT (flaked)*	lb.	.42	- .46
0*	lb.	.39	- .41
Borax, Granular (l.c.l.)	ton	89.00	- 94.00
Carbowax 4000*	lb.	.31	- .32
CD Mold Release B*	gal.	5.00	—
B-2*	gal.	5.00	—
Colite Concentrate* (dms.)	gal.	.90	- 1.15
Colite D43D*	gal.	1.15	- 1.40
Concentrex*	lb.	—	- .25
Dag Dispersions No. 197*	lb.	1.85	- 2.90
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. Emulsion No. 7*	lb.	1.59	- 2.07
No. 8*	lb.	1.20	- 1.74
No. 35*	lb.	1.20	- 1.74
No. 35A*	lb.	1.20	- 1.74
No. 35B*	lb.	1.20	- 1.74
No. 36*	lb.	1.20	- 1.74
D.C. Mold Release Fluid*	lb.	3.04	- 3.61
Dri-Lube*	lb.	—	- .22
Dryflo* (bags)	lb.	21.40	- 21.55
Emulsion Lubricant A80*	lb.	—	- 1.20
45*	lb.	—	- 1.20
2-E Silicone Emulsion SM-55*	lb.	1.18	- 1.74
SM-61*	lb.	1.18	- 1.74
SM-62*	lb.	1.18	- 1.74
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
SF-96*	lb.	3.04	- 4.25
Hawkeye Flake* (dlvd.)	lb.	.15	- .15¾
HSC No. 35*	lb.	1.22	- 2.46
No. 515	lb.	1.22	- 2.46
Igepal CO-430*	lb.	—	- .29
CO-630*	lb.	—	- .29
CO-530*	lb.	—	- .29
Igepon AP-78*	lb.	—	- .48
T-33*	lb.	—	- .21
T-51*	lb.	—	- .13½
Kokobace R*	lb.	.17½	- .18½
Lipal 9-N*	lb.	.28	- .29
7-O*	lb.	.29	- .30
Lubrex	lb.	.25	- .30
Lubri-Flo*	gal.	10.00	- 12.00
Migralube*	lb.	—	- .35
ML-1027-2C*	gal.	—	- 2.65
ML-1028-2C*	gal.	—	- 2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	- 1.90
Mold Lubricant No. 735* (dms.)	gal.	—	- 1.25
No. 769* (dms.)	gal.	—	- 1.20
No. 825* (dms.)	gal.	—	- 2.00
No. 856* (dms.)	gal.	—	- 1.90
No. 880* (dms.)	gal.	—	- 1.19
No. 887* (dms.)	gal.	—	- 1.80
No. 935* (dms.)	gal.	—	- 1.56
No. 956* (dms.)	gal.	—	- 2.50
No. 965* (dms.)	gal.	—	- 2.15
No. 967* (dms.)	gal.	—	- 2.40
No. 969* (dms.)	gal.	—	- 1.50
No. 975* (dms.)	gal.	—	- 2.85
No. 980* (dms.)	gal.	—	- 1.53
No. 987* (dms.)	gal.	—	- 2.45
A 187* (dms.)	gal.	—	- 1.90
A 256* (dms.)	gal.	—	- 1.20
A 988* (dms.)	gal.	—	- 2.60
Moldeze No. 3*	gal.	—	- 4.95
Mold-Brite*	gal.	—	- 1.50
Monopole Oil MD*	lb.	—	- .16
MR-22 Silicone Semi-Permanent	gal.	9.95	- 14.95
Olate Flakes*	lb.	.23½	- .24¾
Orvus WA Paste* (dms.)	lb.	—	- .23¼
Plaskon Polyethylene S*	lb.	.32	- .47
Poly-Brite PE-20	lb.	.28	- .42
600	lb.	.42	- .58
Poly-Cone 125X	lb.	1.20	- 1.40
1,000	lb.	.93	- 1.06
Polyglycol 15-200*	lb.	.25	- .28¾
E4000*	lb.	.31	- .37
Prodag*	lb.	.30	- .52
Purity Flake* (dlvd.)	lb.	.18¾	- .19¾
Rubber-Flo*	gal.	1.25	- 2.00
Rubber-Glo*	gal.	—	- .94
Rusco Mold Paste*	lb.	—	- .25
Sericite* (l.c.l.)	ton	65.00	- 75.00
Silicone Oil A145*	lb.	3.22	- 3.61
A220* (dms.)	lb.	—	- 2.80
Silrex (dms.)	lb.	—	- .65
A65*	lb.	2.50	- 2.75

LUBRICANTS, MOLD (Cont'd)

Soybean Lecithin	lb.	.13	- .1⁄
Thermalube*	lb.	—	- .13¾
UC Silicone L-45*	lb.	3.04	- 4.75
L-522*	lb.	2.68	- 3.50
LE-45*	lb.	1.20	- 1.70
LE-450*	lb.	1.20	- 1.70
Ucon Lubricants*	lb.	.26¾	- .27¾
Ulco Mold Soap*	lb.	.19	- .29

LUBRICANTS, RUBBER

Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	- .25
Extrud-o-Lube*	gal.	1.33	- 1.54
G.B. Naphthenic Neutrals*	gal.	.11	- .18
Ivory Chips*	lb.	.19¾	- .20¾
Latex-Lube GR* (dlvd.)	lb.	.19¼	- .20
No. 82-A* (450 lb. dms.)	lb.	—	- .08½
Propylene Stearate (dms.)	lb.	.35	- .60

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.41	- .46
Calcium Stearate	lb.	.39	- .44
Crown Brand*	lb.	.37	- .42
D.C. 7 Compound*	lb.	5.05	- 6.50
D.C. 200 Fluid*	lb.	3.04	- 3.61
ELA*	lb.	—	- .82
G-E Silicone Fluid SF-92*	lb.	3.04	- 4.25
Glycerized Lubricant*	gal.	1.25	- 1.40
Glydag B*	lb.	1.50	- 2.10
Glyso-Lube* (dms.)	lb.	—	- .14
No. 3* (dms.)	lb.	—	- .14
HSC No. 35*	lb.	1.28	- 1.34
No. 515*	lb.	1.28	- 1.34
Hydro-Zinc*	lb.	—	- .20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	- .18¼
R-66*	lb.	—	- .16½
Liqui-Lube* (dlvd.)	lb.	—	- .16¼
N.F.* (dlvd.)	lb.	—	- .16¼
N.T.* (dlvd.)	lb.	—	- .16¼
Lubrex*	lb.	.25	- .30
Lubri-Cote	gal.	.86	- 1.00
Magnesium Stearate	lb.	.42	- .47
Crown Brand*	lb.	.40	- .45
Polyethylene Glycol	lb.	.22	- .26
Rubber Free (Concentrate)*	gal.	—	- 1.44
Jel*	lb.	.18	- .21½
Separex*	lb.	—	- .10½
Slab-Dip* (dms.)	lb.	—	- .17
Soybean Lecithin	lb.	.13	- .17
Stock-Lube*	lb.	—	- .19
UC XL-42*	lb.	3.14	- 4.75
XLE-42*	lb.	1.22	- 1.70
XLE-420*	lb.	1.22	- 1.70
Zinc Stearate	lb.	.41	- .46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	- 1.65
Alkon* (dlvd.)	lb.	.16	- .16½
CA-301*	gal.	—	- 2.49
CA-302*	gal.	—	- 2.63
G-O 6910*	lb.	.38	- .40
Metso Anhydrous*	cwt.	5.70	- 7.95
Metso 99*	cwt.	5.00	- 7.25
200*	cwt.	6.70	- 8.95
Granular*	cwt.	4.45	- 6.70
Orvus Extra Granules*	lb.	.23½	- .24¼
Polo*	lb.	.12¾	—
Rubber-Sol*	gal.	2.97	- 3.97
Shelblast*	lb.	.04	- .08¼
Sprex A.C.* (dlvd.)	lb.	.17¾	- .18¾
Zip Mold Cleaner*	gal.	1.05	- 1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	- 1.25
Pepton 22 Plasticizer*	lb.	.83	- .86
65*	lb.	1.23	- 1.26
65B*	lb.	.83	- .86
Pitt-Consol 640 (dms.)	lb.	.37	- .42
RPA 2*	lb.	—	- .85
3*	lb.	—	- .51
3 Conc.*	lb.	—	- .85
5*	lb.	—	- 1.10
6*	lb.	—	- 1.66

PLASTICIZERS & SOFTENERS

Acto 500*	lb.	—	- 09
Adipol BCA*	lb.	.45	- .45½
2EH*	lb.	.42½	- .43½
10A*	lb.	.42½	- .43½
ODY*	lb.	.45½	- .46½
810*	lb.	.42½	- 45¼
XX*	lb.	.42½	- 43½
Admex 562 (dms.)	lb.	.50¼	- .51¼
710 (dms.)	lb.	.35¼	- .36¼
711 (dms.)	lb.	.37¼	- .38¼
744 & 745 (dms.)	lb.	.41¼	- .42¼
760 (dms.)	lb.	.59¼	- .60¼
761 (dms.)	lb.	.46¼	- .47¼

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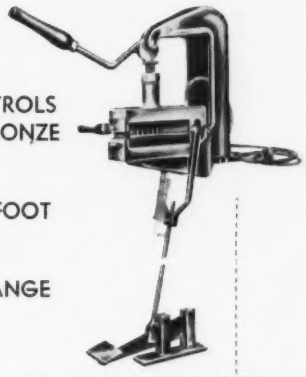

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PLASTICIZERS & SOFTENERS (Cont'd)

Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.06	.07½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¾
B*	lb.	.06¼	.06½
Barol D*	gal.	—	.382
F*	gal.	—	.53
Bearflex 1751*	lb.	.15	.18½
Beeswax, Bleached	lb.	.73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60½
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¾	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.R.T. 3*	lb.	.0188	.0265
4*	lb.	.0250	.0260
7*	lb.	.0300	.0310
B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08
Bunatak AH*	lb.	—	.09½
N*	lb.	—	.31
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.12½	.13½
Butyl Carbitol Perlargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.25½	.26½
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.23½	.25
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¾	.05¾
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.57
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.72	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.80	.88
Yellow	lb.	1.22	1.26
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
179-EG* (t.c., dlvd.)	lb.	—	.32½
DBP* (t.c., dlvd.)	lb.	—	.30
DOP* (t.c., dlvd.)	lb.	—	.28½
TPP* (dms., eqld.)	lb.	—	.40
Ceresin Wax	lb.	.12	.30
Chlorowax 40*	lb.	.15¼	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.16	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¼
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.56¼
Dibutyl Phthalate (dms.)	lb.	.28½	.30
Dibutyl Sebacate	lb.	.67½	.68½
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.29	.30
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.49	.49½
Dicyclohexyl Phthalate	lb.	.58¼	.59¼
Diethyl Phthalate (dms.)	lb.	.27½	.29
Di-2-ethylhexyl Phthalate (dms.)	lb.	.27½	.29
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¼
Di-iso-octyl Adipate	lb.	.42½	.44
Dimethyl Phthalate (dms.)	lb.	.27½	.29
Dimethyl Phthalate	lb.	.32	.33
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44½	.47½
Dinopol 235*	lb.	.36	.37
IDO*	lb.	.31	.32
MOP*	lb.	.31½	.32½
Dioctyl Adipate (dms.)	lb.	.42½	.44
Dioctyl Phthalate (dms.)	lb.	.27½	.29
Dioctyl Sebacate (dms.)	lb.	.61¼	.63¼
D.I.O.P. (dms.)	lb.	.27½	.29
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	lb.	.03	.06
33	gal.	.21	.33
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38

PLASTICIZERS & SOFTENERS (Cont'd)

Esparto Wax	lb.	—	.55
Estac*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.27½	.28½
DOP*	lb.	.30½	.31½
TOF*	lb.	.45½	.46½
3GH*	lb.	.46	.46¾
3GO*	lb.	.55	.55¾
4GO*	lb.	.35	.36
426*	lb.	.29½	.30½
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.30½	.33¼
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼
Fortex A* (dms.)	lb.	.12½	.14½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¼
G.B. Asphaltic Flux*	gal.	.0970	.1770
G.B. Light Process Oil*	lb.	.02¾	.03¾
Medium Process Oil*	lb.	.03¾	.04¾
G.B. Naphthenic Neutrals*	gal.	.12½	.21½
Good-rite GP233*	lb.	.40	.43½
GP235*	lb.	.40	.43½
GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Hallco C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Harflex 300* (dms.)	lb.	.60½	.61½
325* (dms.)	lb.	.45	.46
375* (dms.)	lb.	.76	.77
500* (dms.)	lb.	.34	.35
HB20*	lb.	.15	.17
HB40*	lb.	.21	.22
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¾
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¼	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	lb.	.25	.32
No. 28 and 38*	lb.	.20	.27
Indonex 632½* (633½*, 634½*, 637½*)	gal.	.12	.19
Isooctyl Decyl Phthalate (dms.)	lb.	.28¼	.30
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28½
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb.	—	.40
KP 23*	lb.	.31½	.32½
90*	lb.	.42½	.43½
140*	lb.	.48	.48½
201*	lb.	.58	.59
220* & 260*	lb.	.35½	.36½
666*	lb.	.59½	.60
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.33	.36
Kronitex AA* (dms.)	lb.	.35	.36
I* (dms.) and K-3*	lb.	.35	.36
MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.50
Methox*	lb.	.40½	.41
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.22	.29
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69½
Natac*	lb.	.12	.13
Nebony Resins* (dms.)	lb.	.04½	.05
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13½
LX-685* (dms.)	lb.	.12½	.17½
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
Nuba 1* (and 2*) (dms.)	lb.	.06¼	.06¾
No. 480 Oil Proof Resin*	lb.	—	.18
Ohopex Q10* (dms.)	lb.	.30½	.31½
R9* (dms.)	lb.	.37¼	.37¾
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Paradene Resins (dms)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048

PLASTICIZERS & SOFTENERS (Cont'd)

Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¾	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.35	.36
G-62*	lb.	.37	.38
Parmo*	lb.	.06	.13½
Petrolatum (dms.)	lb.	.04¼	.14⅜
PG-16*	lb.	—	.35
Philrich-5* (t.c.)	gal.	—	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.05½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.12	.13
Piccoumaron Resins*	lb.	.07	.24½
Pigmentar* Pigmentaroil*	lb.	.0460	.0634
Plastac M*	lb.	—	.09¾
Plasticizer 2286*	lb.	—	.26¾
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	—	.07
Plasticizer MP*	lb.	—	.08
Plasticizer MT-511*	lb.	—	.68¾
Plasticizer ODN*	lb.	.35	.41
Plasticizer SC*	lb.	.40½	.42
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	—	.52
52*	lb.	.37¾	.38¾
VS*	lb.	.41¾	.42¾
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¾	.40¾
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.28½
332*	lb.	.29	.32½
562*	lb.	.28	.29
662*	lb.	.28	.29½
532 and 632*	lb.	.40	.41¾
ED*	lb.	—	.51
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¾
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¾
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	—	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380	.0554
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0380	.0554
PX-104*	lb.	.30	.32½
PX-108*	lb.	.30½	.33
PX-138*	lb.	.32½	.33½
PX-208*	lb.	.44½	.45½
PX-238*	lb.	.44½	.45½
PX-404*	lb.	.66	.67
PX-438*	lb.	.60	.61
PX-800*	lb.	.34	.35
PX-917*	lb.	.36½	.37½
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
465 Resin* (dms.)	lb.	.07½	.08
Resin C*	lb.	.0225	.0310
Resinex*	lb.	.03¾	.05¼
L-4*	lb.	.02¼	.03¼
Rexflex*	lb.	—	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	—	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¼
Santicizer B-16*	lb.	.48¼	.49¼
E-15*	lb.	.54	.55
M-17*	lb.	.46	.47
No. 140*	lb.	.35	.36
No. 141*	lb.	.36	.37
No. 160*	lb.	.29	.30
No. 602*	lb.	—	.28½
No. 603*	lb.	—	.27
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58	.60½
DOS*	lb.	.58	.60½
IXA*	lb.	.32	.35
KA*	lb.	.36	.38¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Sunny South Burgundy Pitch*	lb.	.1030	.1085
Rosin Oil*	gal.	.58	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	—	.33
Synthetic Revertant Oil	lb.	—	.16

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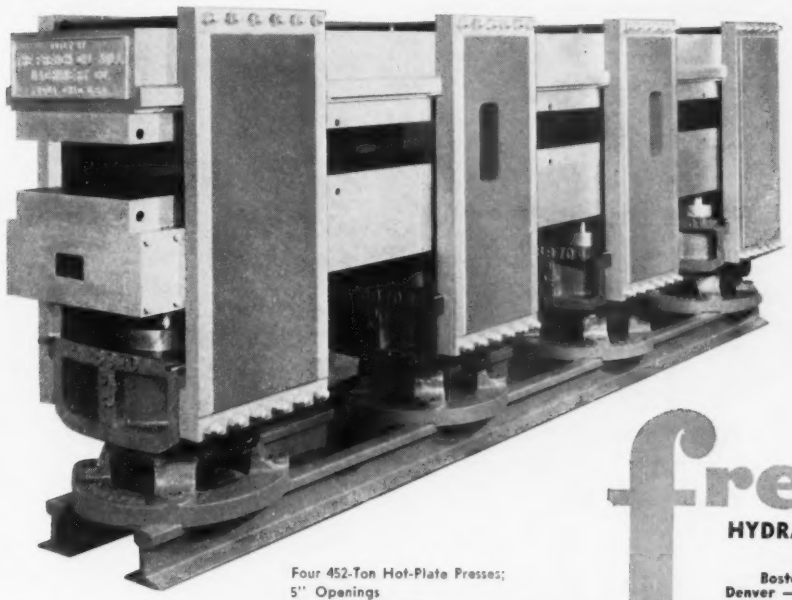

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MFRS. OF SLITTERS, WEB GUIDES, REWINDING AND CONSTANT TENSION EQUIPMENT

PLASTICIZERS & SOFTENERS (Cont'd)

Tar, Refined	gal.	.1200 -	.1760
Tarpine	lb.	.035 -	.050
Terpene A*	gal.	— -	.65
Tetraflex R-122*	lb.	.27 -	.30½
TP-90B*	lb.	.59 -	.69
TP-95*	lb.	.65 -	.75
Transphalt Resins*	lb.	.03¾ -	.05¼
Tributyl Phosphate	lb.	.52½ -	.55½
Tricresyl Phosphate	lb.	.32½ -	.36
Turgum S*	lb.	.10¾ -	.11¾
Turgum SB*	lb.	.07 -	.08
Turpol NC-1200*	lb.	.67 -	.70
NC-1300*	lb.	— -	.50
Vanadiset B*	lb.	.036 -	.07
C*	lb.	.031 -	.06
MR 80 Mesh*	lb.	.08½ -	.12½
Vistac No. 1*	gal.	1.00 -	1.21
P*	lb.	.18 -	.18½
Vopcolene 50*	lb.	— -	.31
Witcizer 100*	lb.	.26 -	.27
200*	lb.	.22¼ -	.25¼
300*	lb.	.30 -	.33½
312*, 313*	lb.	.28 -	.31½
412*	lb.	.42½ -	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.26½ -	.27½
Refined (dms.)	lb.	— -	.18½
Castorwax*	lb.	.25 -	.31
Dutrex 7*	lb.	.12 -	.20
ELA*	lb.	— -	.82
Hydrofol Glycerides 200*	lb.	.15½ -	.19¾
Kenflex N*	lb.	.19 -	.26
Maleic Anhydride	lb.	— -	.27
Millrex*	lb.	— -	.15
Nadic Anhydride	lb.	— -	.75
Polycin*	lb.	— -	.24½
Resin No. 510*	lb.	.19 -	.26
No. 529*	lb.	.25 -	.32
Pulverized*	lb.	.20½ -	.25
Thiomalic Acid	lb.	— -	3.50
Zyrox*	lb.	.78 -	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾ -	.21
Alcogum*	lb.	.08½ -	.24
Alpha Protein	lb.	— -	.23
Aroostocrat*	lb.	— -	.07½
Carob Bean Flour	lb.	— -	.50
Casein	lb.	.22 -	.35
Emcol K-8300* (dms.)	lb.	.14 -	.18
Ethylene Diamine 68%	lb.	.44 -	.47
Gum Arabic	lb.	— -	.23
Karaya Gum	lb.	— -	.35
Locust Bean Gum	lb.	— -	.50
Prosein*	lb.	— -	.06
Stablex B*	lb.	.50 -	.95
K*	lb.	.27 -	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34 -	.35
Armeen C*	lb.	.46 -	.52
Mixed Crude*	lb.	.19 -	.25
T*	lb.	.32 -	.38
Burco RA*	lb	.05 -	.081
BWH-1*	gal.	.17 -	.18
C-6 Oil* (28* & 32*)	gal.	.33 -	.38
C-10 Oil*	gal.	.25 -	.30
C-33* (t.c.)	gal.	— -	.21½
C-42* (t.c.)	gal.	— -	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	— -	4.50
Liquid 50% (t.c.)	cwt.	— -	2.80
Solid 76% (c.l., dms.)	cwt.	— -	4.10
Cresylic Acid (99-100%)	gal.	.85 -	1.39
D-4* (t.c.)	gal.	— -	.27
E-5* (t.c.)	gal.	— -	.25
Flake Calcium Chloride (77-80%)	ton	— -	29.00
G.B. Reclaiming Oil*	gal.	.13½ -	.21½
CD-10*	gal.	.11½ -	.19½
CD-50-U*	gal.	.19½ -	.27½
Gensol No. 6* (t.c.)	gal.	— -	.42
Heavy Aromatic Naphtha	gal.	.13¼ -	.18½
LX-77 Reclaiming Solvent*	gal.	.21 -	.33
LX-572 Reclaiming Oil*	gal.	.27 -	.32
LX-777 Reclaiming Oil*	gal.	.23 -	.33
Neo-Fat D-242*	lb.	.05½ -	.07¼
42-70*	lb.	.08¼ -	.10¼
No. 517 H.B. Oil*	gal.	.11½ -	.16½
535*	gal.	.22 -	.27
Nucom* (t.c.)	gal.	— -	.42
Pitt-Consol "500" (dms.)	lb.	.30 -	.30½
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0380 -	.0554
Q Oil* (t.c.)	gal.	— -	.286
Reclaiming Oil 3186-G*	gal.	.26 -	.33
Reclaiming Reagent No. 1431*	lb.	.21 -	.25
R.P.A. No. 3*	lb.	— -	.51
RR-10*	lb.	— -	.37
Soda Ash (c.l., bags)	cwt.	— -	1.75
Solvent 534*	gal.	.20½ -	.26½
Solvent Oil 21*	gal.	.24 -	.26
C-42*	gal.	.23 -	.38
X-1 Resinous Oil*	lb.	.0225 -	.0325
701 Oil*	gal.	.27 -	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC-98*	lb.	.0775 -	.1550
Croflex*	lb.	.0775 -	.1550
Dixiedensed (and S)*	lb.	.0775 -	.1550
Kosmobile (and S)*	lb.	.0775 -	.1550
Micronex HPC*	lb.	.0775 -	.1550

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0775 -	.1550
Atlantic MPC-95*	lb.	.0775 -	.1550
Continental A*	lb.	.0775 -	.1550
Croflex TH*	lb.	.0775 -	.1550
Dixiedensed HR (and S-66)	lb.	.0775 -	.1550
Kosmobile HM (and S-66)	lb.	.0775 -	.1550
Micronex Standard*	lb.	.0775 -	.1550
Spheron 6*	lb.	.0775 -	.1550
Texas M*	lb.	.0775 -	.1450
Witco No. 1*	lb.	.0775 -	.1550

Channel, Easy Processing (EPC) (bags)

Atlantic EPC E-42*	lb.	.0775 -	.1550
Collocarb*	lb.	.0590 -	.1400
Continental AA*	lb.	.0775 -	.1550
Croflex 77*	lb.	.0775 -	.1550
Dixiedensed 77*	lb.	.0775 -	.1550
Kosmobile 77*	lb.	.0775 -	.1550
Micronex W-6*	lb.	.0775 -	.1550
Spheron 9*	lb.	.0775 -	.1550
Texas E*	lb.	.0775 -	.1450
Witco No. 12*	lb.	.0775 -	.1550
Wyex EPC*	lb.	.0775 -	.1550

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600 -	.3500
Dixie 5 Dustless*	lb.	.1350 -	.2200
Dixie Voltex*	lb.	.2600 -	.3500
Kosmink Dustless*	lb.	.1350 -	.2200
Kosmos Voltex*	lb.	.2600 -	35.00
Spheron C*	lb.	.1800 -	.2400
Voltex*	lb.	.2600 -	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875 -	.1550
Atlantic CF*	lb.	.0925 -	.1600
Continex CF*	lb.	.1100 -	.1700
Croflex CF*	lb.	.0925 -	.1600
Dixie CF*	lb.	.0925 -	.1600
Kosmos CF*	lb.	.0925 -	.1600
Shawinigan Acetylene Black*	lb.	— -	.1900
Vulcan C*	lb.	.1100 -	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500 -	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675 -	.1350
Atlantic 125*	lb.	.0675 -	.1350
Continex FEF*	lb.	.0675 -	.1350
Croflex 50*	lb.	.0675 -	.1350
Dixie 50*	lb.	.0675 -	.1350
Kosmos 50*	lb.	.0675 -	.1350
Philblack A*	lb.	.0675 -	.1350
Statex M*	lb.	.0675 -	.1350
Sterling SO*	lb.	.0675 -	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725 -	.1400
Sterling 99*	lb.	.0725 -	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600 -	.1275
Atlantic 118*	lb.	.0600 -	.1275
Continex GPF*	lb.	.0600 -	.1275
Croflex 35*	lb.	.0600 -	.1275
Dixie 35*	lb.	.0600 -	.1275
Kosmos 35*	lb.	.0600 -	.1275
Statex G*	lb.	.0600 -	.1275
Sterling V*	lb.	.0600 -	.1275
V (Non-Staining)	lb.	.0600 -	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775 -	.1450
Atlantic 130*	lb.	.0775 -	.1450
Continex HAF*	lb.	.0775 -	.1450
Croflex 60*	lb.	.0775 -	.1450
Dixie 60*	lb.	.0775 -	.1450
Kosmos 60*	lb.	.0775 -	.1450
Philblack O*	lb.	.0775 -	.1450
Statex R*	lb.	.0775 -	.1450
Vulcan 3*	lb.	.0775 -	.1450

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, High Modulus (HMF) (bags)

Atlantic 120*	lb.	.0625 -	.1300
Continex HMF*	lb.	.0675 -	.1300
Croflex 40*	lb.	.0625 -	.1300
Dixie 40*	lb.	.0625 -	.1300
Kosmos 40*	lb.	.0625 -	.1300
Modulex HMF*	lb.	.0625 -	.1300
Statex 93*	lb.	.0625 -	.1300
Sterling L*	lb.	.0625 -	.1300
LL*	lb.	.0625 -	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Atlantic 115*	lb.	.0575 -	.1250
Continex SRF*	lb.	.0575 -	.1250
Croflex 20*	lb.	.0575 -	.1250
Dixie 20*	lb.	.0575 -	.1250
Essex SRF*	lb.	.0575 -	.1250
Furnex*	lb.	.0575 -	.1250
Gastex*	lb.	.0625 -	.1350
Kosmos 20*	lb.	.0575 -	.1250
Pelletex*	lb.	.0575 -	.1250
NS*	lb.	.0575 -	.1250
Shawinigan Acetylene Black*	lb.	— -	.1900
Sterling NS*	lb.	.0575 -	.1250
R*	lb.	.0625 -	.1350
S*	lb.	.0575 -	.1250

Furnace Super Abrasion (SAF) (bags)

Atlantic 150*	lb.	.1150 -	.1750
Croflex 85*	lb.	.1150 -	.1750
Dixie 85	lb.	.1150 -	.1750
Kosmos 85	lb.	.1150 -	.1750
Philblack E*	lb.	.1150 -	.1900
Statex 160*	lb.	.1150 -	.1900
Vulcan 9*	lb.	.1150 -	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925 -	.1600
Atlantic 135*	lb.	.0925 -	.1600
Continex ISAF*	lb.	.0925 -	.1600
Croflex 70*	lb.	.0925 -	.1600
Dixie 70*	lb.	.0925 -	.1600
Kosmos 70*	lb.	.0925 -	.1600
Philblack I*	lb.	.0925 -	.1600
Statex 125*	lb.	.0925 -	.1600
Vulcan 6*	lb.	.0925 -	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150 -	.1800
Vulcan SC*	lb.	.1800 -	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	— -	.0575
Sterling FT (c.l.)*	lb.	— -	.0575

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	— -	.0250
Sterling MT (c.l.)*	lb.	— -	.0400
MT Non-Staining (c.l.)*	lb.	— -	.0500
Thermax (c.l.)*	lb.	— -	.0400
Stainless (c.l.)	lb.	— -	.0500

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66 -	1.25
D. C. Silica (pelletized)*	lb.	1.45 -	1.65
Hi-Sil 233*	lb.	.08¾ -	.09¾
X303*	lb.	.40 -	.45
Santocel*	lb.	.62 -	.64
Valron Estersil*	lb.	2.00 -	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40 -	.50
Cato* (bags)	lb.	17.00 -	17.15
Darex Copolymer No. 3*	lb.	.47 -	.49
43G*	lb.	.39 -	.41
Darex Copolymer Latex No. 3-L	lb.	.41½ -	.46
Durez 12687 (and 12707)*	lb.	.36½ -	.40
Durez 13355*	lb.	.27½ -	.31½
Good-rite Resin 2007*	lb.	.36 -	.38
2057*	lb.	.30 -	.31
Hystron*	lb.	.39 -	.41
Kralac A-EP*	lb.	.39 -	.41
Lampblack	lb.	— -	.12
Marbon S and S-1*	lb.	.36 -	.43
8000*	lb.	.36 -	.43
Marmix	lb.	.35 -	.43
Mistron Vapor*	ton	— -	70.00
HGO-55*	ton	— -	95.50
Pliolite Latex 150*	lb.	.35 -	.39
Pliolite Resin-Rubber Masterbatches*	lb.	.33 -	.57
Pliolite NR*	lb.	.93 -	.95
S6B*	lb.	.36 -	.43
Plio-Tuf G85C*	lb.	.52 -	.54
Polyco 220*	lb.	.18¼ -	.19¼
Polypol S-70*	lb.	.25 -	.26

ERIE ENGINE & MFG. CO.

PROCESSING MACHINERY

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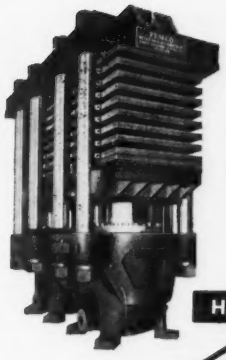

HYDRAULIC PRESSES

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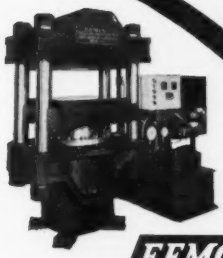
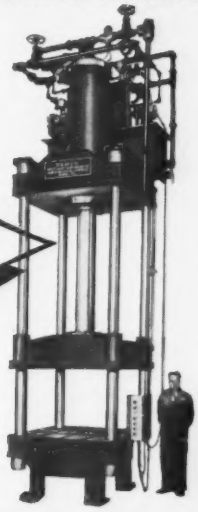
COMPRESSION MOLDING
REINFORCED FIBERGLASS MOLDING
TRANSFER MOLDING
HARDBOARD
PLYWOOD





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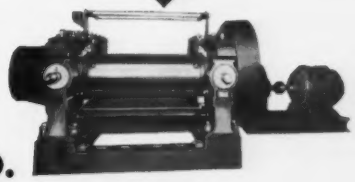

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950 East 12th St., Erie, Pa.

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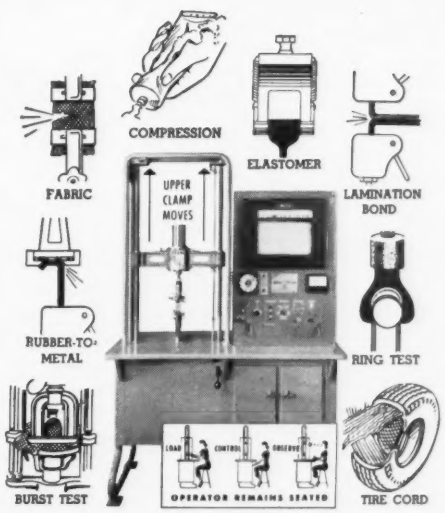

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85 Blackstone St., Providence, R. I.

Representatives in Foreign Countries

New Symbol of World Standard Testing

RETARDERS

Benzoic Acid TBAO-2*	lb.	——	.44
Dutch Boy Normasal*	lb.	——	.46
ESEN*	lb.	.35	.37
Good-rite Vulkrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.62	.64
PD*	lb.	.39	.41
W*	lb.	——	.46
Retardex*	lb.	.46	.46
Wiltrol P	lb.	.39	.41

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	50.00	57.00
Hard Hydrocarbon (dms.)*	ton	53.00	60.00
Herron Flake*	ton	——	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.36
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	——	.36
Neophax*	lb.	.17	.27
Polyrez A and C*	lb.	.12	.17
White	lb.	.15	.26
670 Brown	lb.	.14¼	.14¾

Miscellaneous Rubber Substitutes

G.B. Asphaltenes*	lb.	.06	.06½
Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	——	.62
No. 1198*	lb.	.46¼	.49¾
Tysonite*	lb.	.26	.26¾

SOLVENTS

Acetone (dlvd.)	lb.	.11	.12½
Amsco Lactol Spirits* (t.c.)	gal.	——	.20
Naphthol Spirits*	gal.	——	.19
Mineral Spirits*	gal.	——	.18
Rubber Solvent* (t.c.)	gal.	——	.19
Solv A* (t.c.)	gal.	——	.22
Solv A-80* (t.c.)	gal.	——	.23½
Solv B* (t.c)	gal.	——	.28
Solv B-90* (t.c.)	gal.	——	.31
Solv D* (t.c.)	gal.	——	.30
Solv E*	gal.	——	.30
Solv F*	gal.	——	.30
Solv F-80*	gal.	——	.32
Solv G*	gal.	——	.36
Special Naphtholite* (t.c.)	gal.	——	.19
Special Textile Spirits*	gal.	——	.20
Super Hi-Flash Naphtha*	gal.	——	.34
Super Naphtholite*	gal.	——	.19
Textile Spirits* (t.c.)	gal.	——	.20
Amyl Chlorides, Mixed (l.c.l.) (dms.)	lb.	——	.11
Benzol 90%	gal.	.36	.40
Butyl Acetate	lb.	.17	.18
Butyl Alcohol	lb.	.17	.18
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.0545	.0161
Carbon Tetrachloride	lb.	.10¾	.14¼
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	——	.56
Cyclohexanone	lb.	.29	.31½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	——	.06
Dicom*	gal.	——	.55
Halowax Oil*	lb.	.28	.41
Heptanes* (t.c.)	gal.	.19	.22
Hexanes (t.c.)	gal.	.19	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	.43	.75
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	——	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	——	.12½
N-5 Pentane Mix* (t.c.)	gal.	——	.13½
N-6 Hexanes* (t.c.)	gal.	——	.14½
N-7 Hexanes* (t.c.)	gal.	——	.13½
Penetrell*	gal.	.42	.63
Perchlorethylene	lb.	——	.11
Petrolene* (t.c.)	gal.	——	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb	——	.11¾
Alcohol (t.c., dlvd.)	lb.	——	.11
Pyridine, Refined	lb.	.74½	.75
Quinoline	lb.	.50	.54¼
Rubber Solvent (t.c.)	gal.	——	.16
Rubsol (t.c.)	gal.	——	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	——	.158
C (Heptanes)* (t.c.)	gal.	——	.151
R (Rubber Solvent)*	gal.	——	1.29
Solvent, Crude, Light	gal.	.19	.28

SOLVENTS (Cont'd)

Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	——
Sunny South DD Dipentine*	gal.	.42	.63
Sunny South DD Pine Oil*	lb.	——	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	——	.38
Toluol (t.c.)	gal.	.33	.35
Trichlorethane	lb.	——	.12¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	——	.174
5* (dms.)	gal.	——	.199
7* (t.c.)	gal.	——	.164
2-50 W Hi-Flash*	gal.	——	.41
Xylol	gal.	.34	.38

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.95
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*	lb.	.60	.65
CH-201*	lb.	.60	.65
E-82*	lb.	90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amioca 50*			
85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.75	.80
Barium Ricinoleate (BVS)	lb.	——	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16	.17
Cadmium Ricinoleate	lb.	——	2.00
Calcium Ricinoleate	lb.	——	.55
Dutch Boy DS-207*	lb.	——	.54
Plumb-O-Sil A*	lb.	——	.29¾
B*	lb.	——	.31¾
Tribase*	lb.	——	.26½
Dythal*	lb.	——	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	——	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.66½	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-7*	lb.	——	1.10
2-V-8*	lb.	——	1.30
5-V-1*	lb.	.41	.43
7-V-1*	lb.	——	.90
8-V-1*	lb.	.88	.90
8-V-5*	lb.	——	.80
8-V-100*	lb.	.82	.84
9-V-1*	lb.	.70	.72
12-V-5*	lb.	73	.75
24-V-1*	lb.	1.10	1.12
28-V-2*	lb.	——	1.18
128-V-5*	lb.	.86	.88
Kosol* (bags)	lb.	19.00	19.50
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XT*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
Metasap 613-A*	lb.	——	.69
613-B*	lb.	——	.84
613-C*	lb.	——	1.06
621*	lb.	——	.88
624*	lb.	——	.75
633*	lb.	——	.75
635*	lb.	——	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅜	.32⅜
Sodium Silicates 41°/1:32	cwt.	1.20	2.30
Stabelan E*	lb.	1.40	1.50
XL*	lb.	.55	.65
HR-50*	lb.	.75	.90
HR Liquid*	lb.	.65	.75
HR Paste*	lb.	.85	.95
HR Powder*	lb.	.95	1.05

STABILIZING AGENTS (Cont'd)

No. 110 Liquid	lb.	.65	.75
Istabelan			
No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	——	.70
E6B*	lb.	——	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	——	.60
OM-10*	lb.	——	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	——	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*	lb.	.70	.72
90*	lb.	.70	.72
95*	lb.	.70	.73
229*	lb.	.61	.63
Vanstay A* (dms.)	lb.	.50	.53
AB* (dms.)	lb.	.46	.49
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	.97	1.00
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RZ-25* (dms.)	lb.	.65	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
W* (dms.)	lb.	1.22	1.25
X* (dms.)	lb.	.67	.70
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	——	1.85
Processing Stiffener 710*	lb.	——	.88
Solvitose HDF, H. C-S, T, and E*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	——	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	——	1.67
Ross Sunproofing Waxes*	lb	——	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.31	.32
713*	lb.	.25	.26
Improved*	lb.	.25	.26
Super*	lb.	.40	.41
Jr*	lb.	.20	.21
Tonox*	lb.	.52	.54

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	——	.78
G*	lb.	——	.21
MDL*	lb.	——	.33
ME*	lb.	——	.80
NS*	lb.	——	.60
SMO*	lb.	——	.50
WAQ*	lb.	——	.20
Emulphor EL-620*	lb.	——	.40
EL-719*	lb.	——	.58
ON-870*	lb.	——	.55
Hyonics*	lb.	——	.28¾
Igepal CA-630	lb.	——	.29
CO-630	lb.	——	.29
CO-730	lb.	——	.29
CO-850*	lb.	——	.29
CO-880*	lb.	——	.29
Igepon CN-42*	lb.	——	.25
T-33*	lb.	——	.21
T-51*	lb.	——	.13½
T-77*	lb.	——	.49
Kessco 50201*	lb.	——	.44½
50203*	lb.	——	.44¼
18201*	lb.	——	.32
18203*	lb.	——	.35½
Lipal 9-N.* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	——	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½

TACKIFIERS (Cont'd)

Arcco A-26*	lb.	.18	.19
Bunaweld Polymer No. 780*	lb.	—	.24
No. 5514*	lb.	—	.35
Galex* (dms.)	lb.	.16	.18¾
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	—	.95
Liquid Rubber Flux*	lb.	—	.14
Nacconal NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol*	lb.	.17	.24¾
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	—	.16
Betanol* (dms.)	lb.	.70	.95
CM Starch* (bags)	lb.	26.85	27.00
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (bags)	lb.	9.19	9.34
Melojel* (bags)	lb.	6.71	6.86
Modicol VD*	lb.	.13½	.14⅜
VE*	lb.	.13⅜	.14¾
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	7.00
VA-7*	lb.	—	.50

Sulfur

Blackbird* (c.l.)	cwt.	—	2.85
Cloud* (c.l.)	cwt.	—	2.80
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	.16

VULCANIZING AGENTS (Cont'd)

Devil A* (c.l.)	cwt.	—	2.40
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.00
Spider* (c.l.)	cwt.	—	2.80
Star* (c.l.)	cwt.	—	3.25
Sulfasan R*	lb.	1.55	1.57
Tire* (c.l.)	cwt.	—	2.55
Tube*)c.l.)	cwt.	—	4.40
Vultac 2*	lb.	.47	.49
3*	lb.	.51	.53

Tellurium

Telloy*	lb.	—	2.65

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70
Alrosol* (dms.)	lb.	.35	.41
Alrosperse*	lb.	—	.18
Anhydrol 6990* and 6991*	lb.	.51	.56
Areskap 50*	lb.	.30	.32
Dry 100*	lb.	.60	.64
Aresket Dry 300*	lb.	.60	.64
Aresklene 375*	lb.	.42	.47
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
Emcol 5100* (dms.)	lb.	—	.31
Energetic W-100	lb.	.28½	.35
Etho-Chemicals*	lb.	.26	.58
Ethomeen S/15*	lb.	.48	.50
T/15*	lb.	.46	.48
Kessco E-122* (dms.)	lb.	—	.45
18201*	lb.	—	.32
Kreelon 4D* (dms.)	lb.	.13	.16
8G* (dms.)	lb.	.26	.28
Kyro EO* (dms.)	lb.	—	.29¾
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nacconol SL* (dlvd.)	lb.	.084	.10
60S* (dlvd.)	lb.	.19	.225
Nacconol A* (dlvd.)	lb.	—	.52
Nekal WS-25	lb.	—	.38
WS-99	lb.	—	.95
Orvus AB Granules*	lb.	.16¼	.17¾
Parnol*	lb.	—	.13½
Regal Beads	lb.	.12¾	.16¾
H. D. Beads	lb.	.12¾	.15¾
Santomerse No. 3	lb.	.41	.45
S*	lb.	1.55	1.55

WETTING AGENTS (Cont'd)

Sorapon SF-73*	lb.	—	.18
SF-78*	lb.	—	.30
Sorbit P*	lb.	—	.28
Soybean Lecithin	lb.	.13	.17
Stablex G*	lb.	.50	.90
Tergitol 4* (dms., dlvd.)	lb.	.36½	.37½
7* (dms., dlvd.)	lb.	.43½	.44½
O8* (dms., dlvd.)	lb.	.36½	.37½
P28* (dms., dlvd.)	lb.	.18½	.19
Trenamine W-30	lb.	—	.15
Vultamol*	lb.	—	.17½
Wetsit Conc.*	lb.	.35	.35

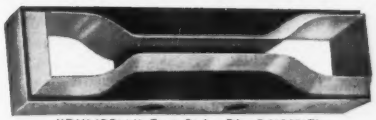
MISCELLANEOUS CHEMICALS

Aquesperse 30*	lb.	—	.11
Arccopel W-18*	lb.	.17	.19
Black-Out Black, Clear & White	gal.	4.50	8.00
Chiplac Plaint	gal.	1.15	5.00
Copper Inhibitor No. 65*	lb.	—	1.57
D-Tac*	lb.	—	.22
2-Ethyl Hexanol	lb.	.23¼	.24¾
Fura-Tone Resin 1226*	lb.	.41	.43
MODX*	lb.	.38	.40
Nacconates* (dms.)	lb.	.99	3.53
Para Resins*	lb.	.04	.04½
Pigmented Filmite* (dlvd.)	lb.	.16¾	—
Resorcin, Tech.	lb.	.77½	.81½
Rio Resin*	lb.	.70	.72
Rongalite CX*	lb.	—	.21½
Sherosopes*	lb.	.13½	.18¾
Sublac Resin PX-5*	lb.	.23½	.24½
Synpep*	lb.	.54	.60
Thiokol LP-205*	lb.	—	4.00
Tysonite*	lb.	.30	.30¾
Vanfre*	gal.	2.45	3.00
No. 3* & No. 4*	gal.	1.95	2.00

SUPPLIERS

Are Your Materials Listed in the Market Prices Section? Forward full Information to Market Editor

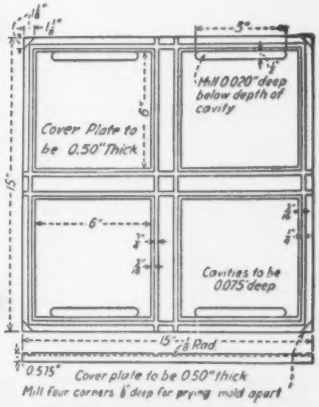
HOGGSON TOOLS, MOLDS, DIES



"DUMBELL" Test Strip Die D412(SIT)

For Rubber Testing and Production

For making tensile test samples, we make many types of slab molds. One is detailed at the right. These are plain or chrome finished. We usually stock molds for making adhesion, abrasion, flexing, compression and rebound test samples, but supply special molds promptly. We also furnish hand-forged tensile dies for cutting regular or tear test samples.


SLAB MOLD D15-55
Mill 0.020" deep below depth of cavity
Cover Plate to be 0.50" Thick
Cavities to be 0.075 deep
15" 1/8 Rod
0.515" Cover plate to be 0.50" thick
Mill four corners 1/8" deep for prying mold apart

HOGGSON & PETTIS MFG. CO., 141A Brewery St., New Haven 7, Conn.

Pac. Coast: H. M. Royal, Inc., Downey, Calif.

THE **DAILY** GUIDE

This is indispensable to buyers of Rubber

THE TRADE NEWS SERVICE

Established 1915

24 Stone St. New York 4, N. Y.

featuring

MARKET REPORTS • RUBBER IMPORTS • STATISTICS

Write for Free Trial Service

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Monthly Technical Journal

The First Rubber Journal in Spain

Founded: January, 1929

Founder, owner, director and administrator:

Juan Blanch Guerrero

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All Classified Advertising must be paid in advance except for advertisers on contract. Send check with copy.

Replies to keyed advertisements will be forwarded to advertiser without charge.

Address all replies to Box Numbers care of RUBBER AGE, 101 West 31st St., New York 1, N. Y.

Copy for July, 1959, issue must be received by Thursday, June 25.

POSITIONS WANTED

CHEMIST—Eight years experience in rubber and plastics constituting formulation, research, product development and chemical sales. Seeks responsible position in midwest rubber plant or as technical representative servicing rubber, plastics, tape and adhesives. Please reply with job description. Address Box R-388-P, RUBBER AGE.

GENERAL MANAGER—Industrial Engineer. 20 years heavy experience—results record in mechanical molded, footwear, aircraft ordnance. Incentives, methods, costs, estimating sales, purchasing production and quality control, personnel, labor relations. Extensive sales contacts. Relocate, prefer middle west. Address Box R-389-P, RUBBER AGE.

EXPORT—Overseas representative for rubber or chemical manufacturers. 15 years production and sales experience in Europe. Fluent in English, French, German, Dutch and Indonesian. Address Box R-399-P, RUBBER AGE.

PRODUCTION MANAGER, GENERAL FOREMAN—Extensive experience in the manufacturing of latex dipped goods, from compounding to finished products. Heavy experience in surgical and household gloves, also balloons and anesthesia rubber parts. Seeks opportunity with progressive firm. Will relocate anywhere, but far west preferred. Address Box R-394-P, RUBBER AGE.

LATEX EXECUTIVE: Mr. Company President, here is a rare opportunity to have on your staff a seasoned, tireless worker who can get the job done right. I have an engineering degree, business background, experienced successful salesman, proven R & D worker and administrator, and an excellent production man. Have diversified textile, chemical and petroleum background. Am considered one of the top men in the compounding field. Now have a very responsible top-level job without a top-level salary or opportunity for growth. Open for a proposition which will make money for both of us. Address Box R-400-P, RUBBER AGE.

PLANT MANAGER—Must relocate and willing to locate anywhere. 20 years of solid and diversified experience. Aggressive, and have record for delivering top results. Product experience covers all types mechanicals—both solid and sponge, extrusions, latex dipped, foam products, sundries, novelties, and urethane coatings. Successful administrator. Have excellent record in labor relations, cost and production controls, product and tool design, sales, and compounding. Seek connection with progressive and modern thinking, medium-sized company. Address Box R-405-P, RUBBER AGE.

MOLD DESIGN & PROCESS ENGINEER—with 15 years experience in all latest molding, processing and equipment methods. Emphasis on precision molding of seals, O-rings and related items. Cost reduction, administrative and customer contact experience. Seeks permanent connection with good potential. Address Box R-406-P, RUBBER AGE.

HELP WANTED

FOREMAN WANTED

Canvas and Rubber Footwear plant located in California is seeking capable foreman willing to relocate in California. Send resumé. THE RUBBER CORP. OF CALIFORNIA, Garden Grove, Calif.

RUBBER CEMENT COMPOUNDER—Knowledge of solvent formulations using all synthetics and natural rubber for use in adhesives, laminants, coatings. Salary open, opportunity unlimited in financially stable growth company. Location Stamford, Conn. Submit resumé to Director of Research, POLYMER INDUSTRIES, INC., Springdale, Conn.

PLANT PRODUCTION MANAGER

We are a young, progressive company with a work force of 150 people. We manufacture flexible rubber and silicone hose. Our business has doubled every two years over the last six year period. Excellent geographic location. We are looking for a topnotch production manager to take full responsibility for production and play a leading role in our management. Chemical background and miscellaneous rubber experience desirable. Give full details on work experience, training, salaries earned and family status. Address Box R-393-W, RUBBER AGE.

CHEMICAL ENGINEER

Graduate Chemical Engineer. Product development work plastics and elastomers—similar experience desirable but not necessary. Send resumé and salary desired: E. L. Bixby, GOODALL RUBBER CO., Trenton 4, N. J.

HELP WANTED—Continued

SUPERINTENDENT—BONDED RUBBER

Capable of making bonded foam and bonded sponge product. Willing to relocate. Send complete resumé of experience. All replies confidential. Address Box R-401-W, RUBBER AGE.

CHEMIST NEEDED with experience in rubber and resin coatings for fabrics. Also familiar with resin and other textile finishing applications. Write full details concerning background and work experience. Address Box R-402-W, RUBBER AGE.

WANTED

INDUSTRIAL ENGINEER—RUBBER CHEMIST

Nationally known manufacturer of rubber and canvas footwear has desirable openings for right men. Write today giving resumé, qualifications and personal data. All inquiries confidential.

Address Box R-403-W, RUBBER AGE

Excellent Opportunities on Research and Development Staff

RESEARCH CHEMIST—LATEX COMPOUNDS
To conduct applied research in the investigation and evaluation of synthetic latices and the design of new synthetic polymers. Degree, up to 5 years high polymer training, good knowledge of curing systems used in the vulcanization of elastomers. Recent graduates interested in this field will also be considered.

RESEARCH CHEMIST—DRY POLYMER COMPOUNDING
To conduct experimentation and development in dry polymer compounding; explore uses of specialty polymers in molded, extruded and solvent systems used in the fabrication of rubber or elastomeric products. Degree, up to 5 years experience in high polymer curing and processing techniques.

RESEARCH CHEMIST—LATEX IN PAPER (Paper Application)
To develop latices and compounds for industrial application of latex in paper and textiles. Degree, related experience plus essential knowledge of application methods and test procedures required.

SENIOR COMPOUNDER—LATEX MATERIALS DEVELOPMENT
To originate and develop compounds from all types of natural and synthetic elastomers for specific end product use. Degree, prefer experience in dipped goods, but will consider foam latex background.

SENIOR DEVELOPMENT ENGINEER
To conceive and develop new and improved products through better design, appearance or performance. Must be capable of dealing with technical and professional people, able to coordinate activities of diverse groups, and in fact be the guiding force, director, or coordinator of specific product development projects. A B.S. in Engineering, Physics or Chemistry required, plus a minimum of 5 years technical development.

All positions newly created by rapid corporare growth and expansion. Professional atmosphere — new, modern, well-equipped research center—salaries commensurate with experience, plus excellent employee benefit program. Send detailed resume, including salary requirements to:

Executive Placement
International Latex Corporation
Dover, Delaware

"Help Wanted" continued on next page

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Heavy experience in selling coating and backing.
New York location with some traveling.
Immediate opportunity with high starting salary.
Submit resumé and salary requirements with first letter.
Our employees know of this ad.

Address Box R-398-W, RUBBER AGE

WANTED: PLANT MANAGER

Preferably with rubber footwear experience. New England location. Write in confidence giving details of experience and qualifications.

Address Box R-404-W, RUBBER AGE

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Qualifications:

Requires thorough knowledge of use of insulated wire and cable products by utilities and large industrials. Must have electrical engineering degree and five to ten years' cable engineering, sales, and utility experience.

Please reply in full, stating age, education, background, salary requirements, and experience to:

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P. O. Box 671
Newark, Ohio

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ADMINISTRATIVE — TECHNICAL
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FOR SALE

SUPER RUBBER DISTRIBUTOR—Well established business for over 20 years. V-belts, molded and extruded products, midwest warehouse stock. Wonderful opportunity for experienced party. Address Box R-390-B, RUBBER AGE.

MOLDED RUBBER PRODUCT BUSINESS for sale or rent. Location eastern Pennsylvania. Plant consists of 24 x 24 and 30 x 30 inch presses, mill, extruder, molds, trimming dies and other equipment related thereto. Address Box R-395-B, RUBBER AGE.

OPPORTUNITY FOR PARTNERSHIP in Molded Rubber Products Business. Man must have production experience and technical knowledge, including compounding. Must be capable of taking full charge of all production operations. Small capital investment required. Address Box R-396-B, RUBBER AGE.

FOAM RUBBER CUSHION

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Highest references supplied.

Reply fully, in confidence.

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MILFORD, MASS. — Telephone Greenleaf 3-1870

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MIXING
To Your Specification
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Otto J. Lang, General Manager

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Corrosion, weathering and sunlight tests. Four locations in Southern Florida for inland, salt atmospheric, tidewater and total immersion exposure tests.
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FRanklin 6-7161

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Choose MOLD LUBRICANTS with Care
for precision work • for quality • for clean release
We have over 25 varieties of Mold Lubricants, Silicone Oils, Emulsions, Polyethylene Emulsions, and non-Silicones, which are being used by rubber and plastic manufacturers throughout the world.
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For Your Convenience In Testing.
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For Complete Technical Data & Prices
Write or Phone:
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Quarryville, Pennsylvania **STerling 6-2745**

EQUIPMENT WANTED

WANTED—One or two used 75 h.p. reducers with motor to give 65 r.p.m. shaft speed full load; or without motor. We buy mills, tubers, calenders, Banburys, presses. HOUSTON RUBBER MACHINE COMPANY, 3301 Jensen Drive, Houston 26, Texas.

WANTED
Parts for #3 Banbury. Send full information. Address Box R-392-E, RUBBER AGE.

WANTED—THE FOLLOWING USED EQUIPMENT: 1—Baker-Perkins Laboratory Mixer, approximately one gallon capacity. 1—4-Roll Rubber Calender inverted L, 12" x 30". 1—Baker-Perkins, 200 to 300 gallon capacity. All of the above equipment must be in first class condition. Write, wire or call—J. W. Taylor, DAUBERT CHEMICAL COMPANY, 4700 South Central Ave., Chicago 38, Illinois. LUdlow 2-1000.

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LOWEST PRICED . . . FROM OUR OWN LARGEST SOURCE
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- Expert compounding and milling of all grades of soft and hard rubber.
- Top technical assistance.
- High quality, uniform, controlled mixing.

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Plants: Tallapoosa, Ga.; Butler, N. J.

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Four-roll, inverted L, 10" x 18" Farrel Calender complete with 25 HP Westinghouse motor and controls. In good working order. APEX TIRE & RUBBER CO., Pawtucket, R. I.

FOR SALE—At Houston, Texas: Two 16 x 42" end-cap Farrel mills. Several four-post, 14" ram presses, 150 tons @ 2000#, sizes 16 x 24" and 24 x 24". HOUSTON RUBBER MACHINE COMPANY, 3301 Jensen Drive, Houston 26, Texas.

LATEX EQUIPMENT FOR SALE—Discontinued saturation operations releases storage and jacketed mixing tanks, festoon dryer and other equipment. Lists available. Address Box R-397-S, RUBBER AGE.

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FOR SALE

1—22" x 60" Adamson mill, 150 HP.
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1—10" x 18" Farrel 4-roll calender.

CHEMICAL & PROCESS MACHINERY CORP.
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Several 22 x 22 x 60" mills complete with motor and drive
1—18 x 54" mill complete with motor and drive
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1—#00 Banbury mixer
1—#1A Banbury mixer, jacketed
6—24 x 24", 18" ram, steel hydraulic presses
#1, #2, #3, #4 Royle rubber extruders
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Large quantity of large ram presses up to 42 x 42" bed area.
All machines offered are fully rebuilt and guaranteed.
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Reliable
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Top cap 20" x 60" mill with 125 HP motor drive and controls. Located in midwestern plant and can be given running test on location.

18" x 40" 3-roll Calender complete with fourth "L" roll and motor drive. Herringbone gear throughout.

A full line of rubber processing equipment including presses, mills, calenders, cutters, choppers, tubers, etc., etc.

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ALBERT and MACHINERY

are synonymous to the rubber industry

The following is an excerpt from one of our Maryland customers' recent letters pertaining to our service:

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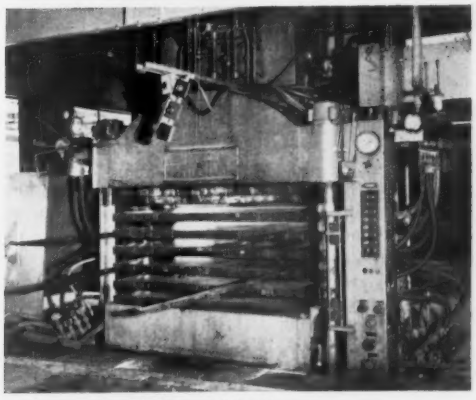
P.O. Box 453, Trenton 3, New Jersey
Phone: EXport 4-7181



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2 Exceptional Molding Presses

Two modern Watson-Stillman 6-deck, 900-ton molding presses with self-contained oil pumps and steam trim.

One 76" side-to-side, 50" front to back
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Must be moved from the Detroit area. Bargain prices on quality machines.

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We are one of the foremost specialists in supplying everything in used, reconditioned and new machinery for the Rubber and Plastics industries only.
NEW—Laboratory mills, hydraulic presses, extruders, bale cutters and vulcanizers. We are interested in purchasing your surplus machinery or complete plant.

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NEW CONCEPT

in calender and mill frame construction — frames of fabricated steel weldments — lifetime guarantee — new machines built in any size

SPECIAL

24" x 72" Farrel 3 roll calender with drive.

Guaranteed
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SHERMAN RUBBER MACHINERY CO.

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that Audubon never knew 'til now

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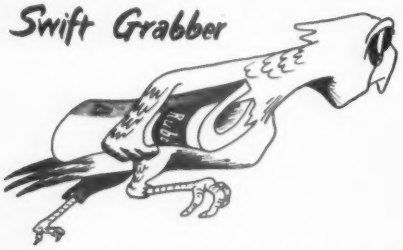

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659

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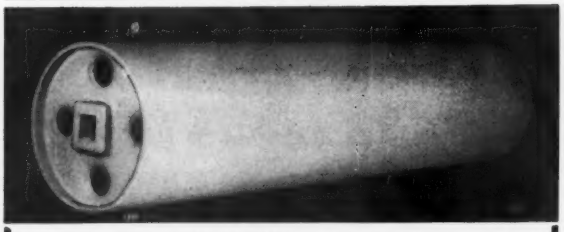

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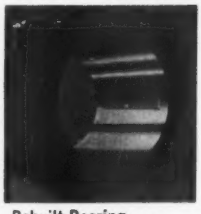

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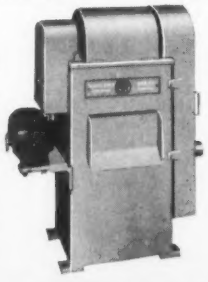

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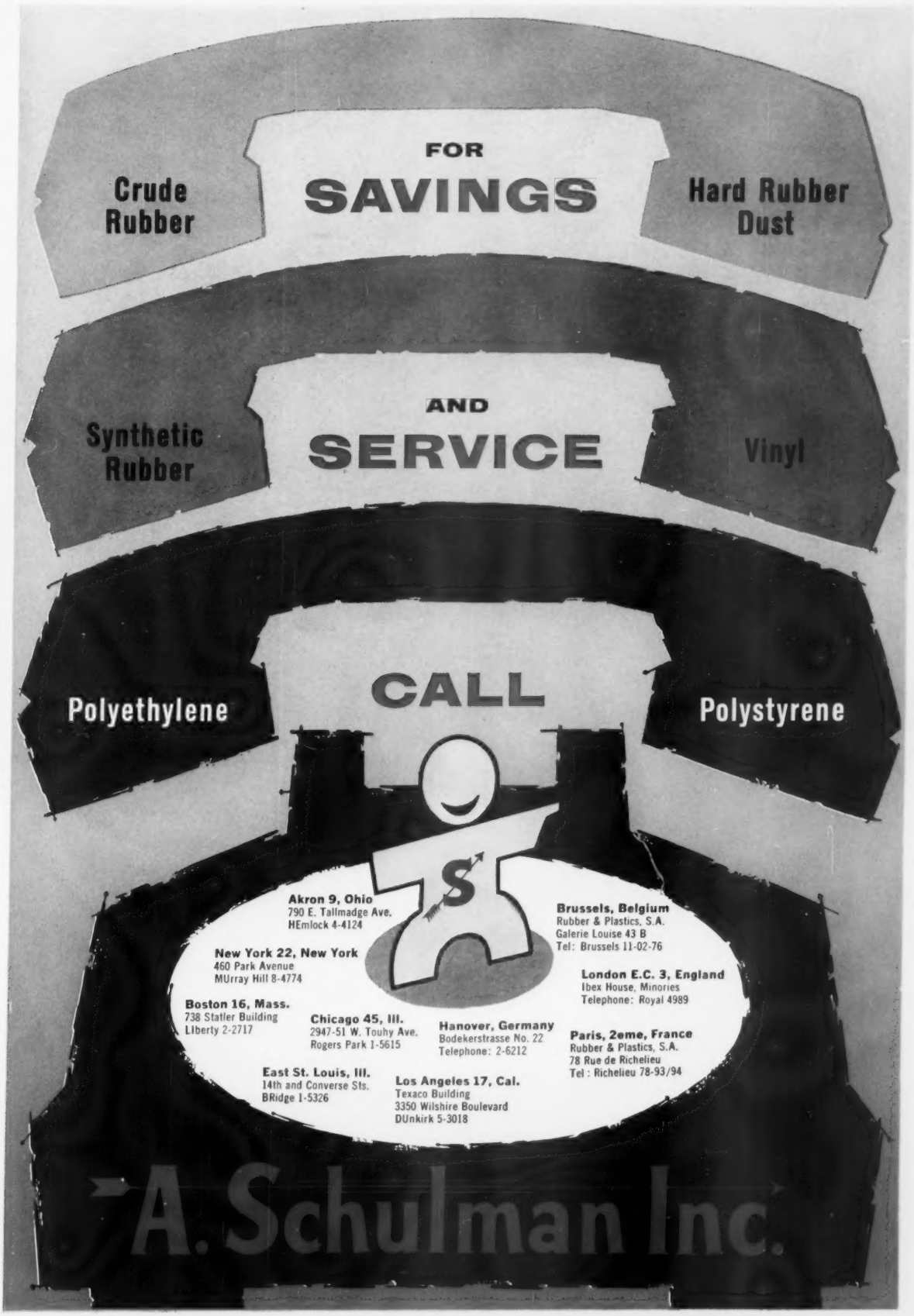
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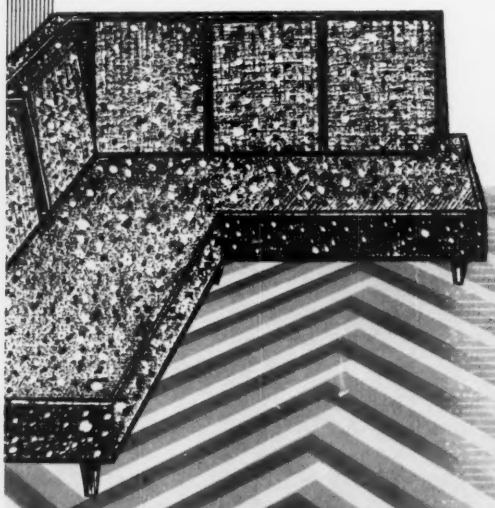

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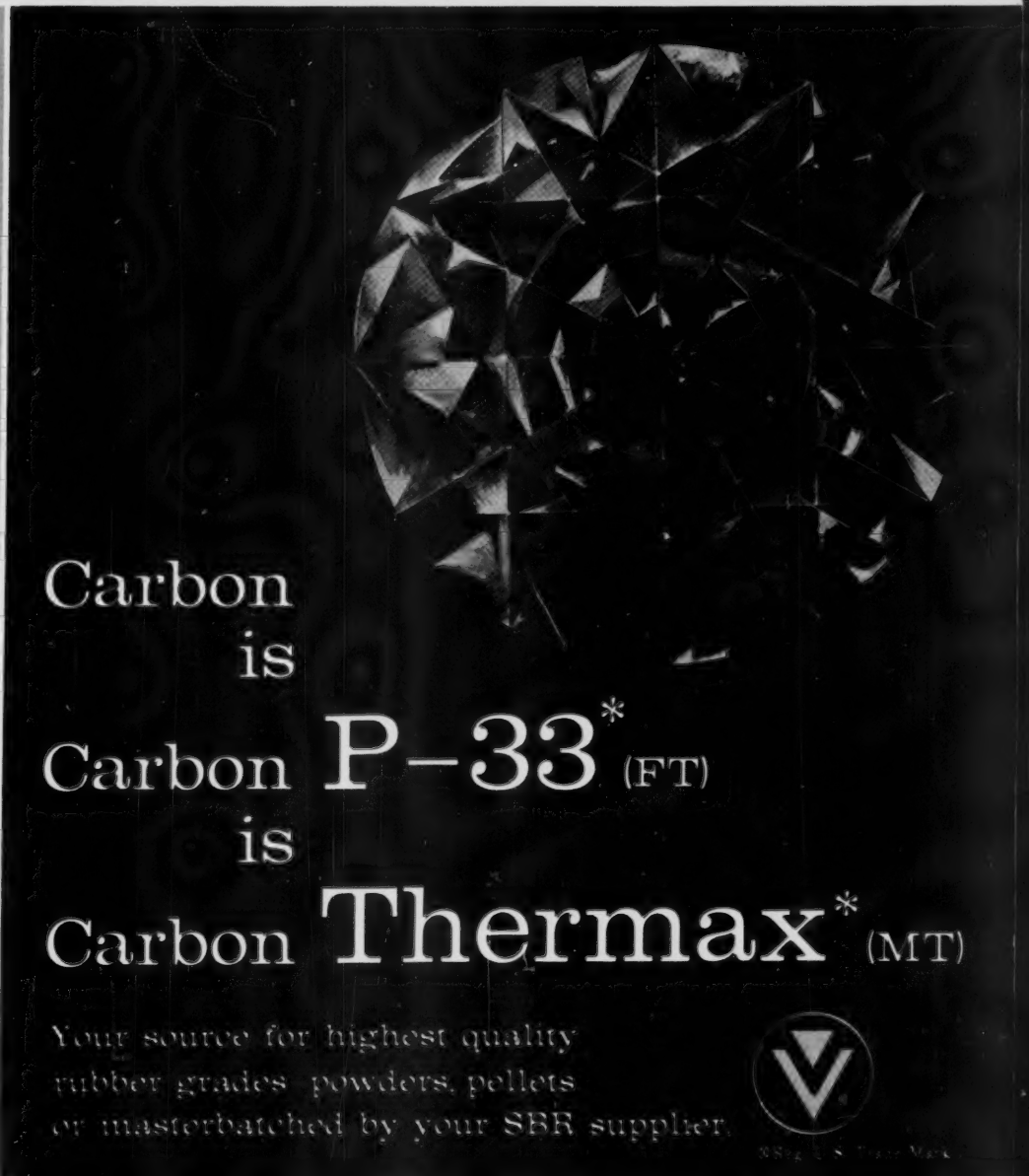
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